IBM Office Products Division
Customer Engineering

INSTRUCTION MANUAL

"Selectric" Composer

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(Complete Manual)
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MOTOR AND DRIVE

The motor and drive system in the IBM "Selectric" Composer must be capable of meeting torque requirements approximately 40 percent higher than the standard "Selectric" Typewriter. For this reason a 1/20 horsepower, capacitor start, motor is employed. The motor mounts the same as on the "Selectric" Typewriter.

An eight-tooth motor pulley locked to a flat spot on the armature shaft by a setscrew provides positive drive for the operation of the machine. A positive drive belt, one half inch wide, transfers rotation of the motor pulley to the cycle clutch pulley. The ratio between the two pulleys is such that a 14 cycle-per-second operating speed is produced (71.4 millisecond cycle time). The slower cycling speed is required by the escapement mechanism.

A 4 mfd capacitor mounts between the left end of the motor and the powerframe. Wired into the start winding circuit, the capacitor provides a starting torque for the motor and controls the direction of rotation. It also remains in the circuit while the motor is running. A rubber boot covers the terminal end of the capacitor for safety.

The "Selectric" Composer is built with either a two wire ungrounded, or a three wire grounded, electrical system. In the two wire ungrounded system both the capacitor and motor are insulated from the powerframe. The capacitor is insulated by a fiber insulating material, and the motor by its rubber ring mounts.

On three wire grounded systems the capacitor, motor, and machine powerframe are all grounded, through the third lead in the line cord, to an exterior ground when the line cord is plugged into an outlet. The ground lead (green) of the line cord fastens directly to the machine powerframe. The fiber insulation around the capacitor is omitted permitting the mounting clamp to ground the capacitor to the powerframe. A short lead connected between the end bell of the motor and the machine powerframe ground the motor to the powerframe (Fig. 1-1).

The ON/OFF switch is a double pole single throw switch. Both sides of the power supply are disconnected from the machine circuit when the switch is in the "off" position.

The torque demand on this machine is high enough that some variations in print quality could be experienced if the line voltage is either low or fluctuating. It is good practice to consider this possibility before attempting to readjust the machine. Print shops usually have several other pieces of electrical equipment operating nearby. The resulting drain on an inadequate power supply could create the reported problems.

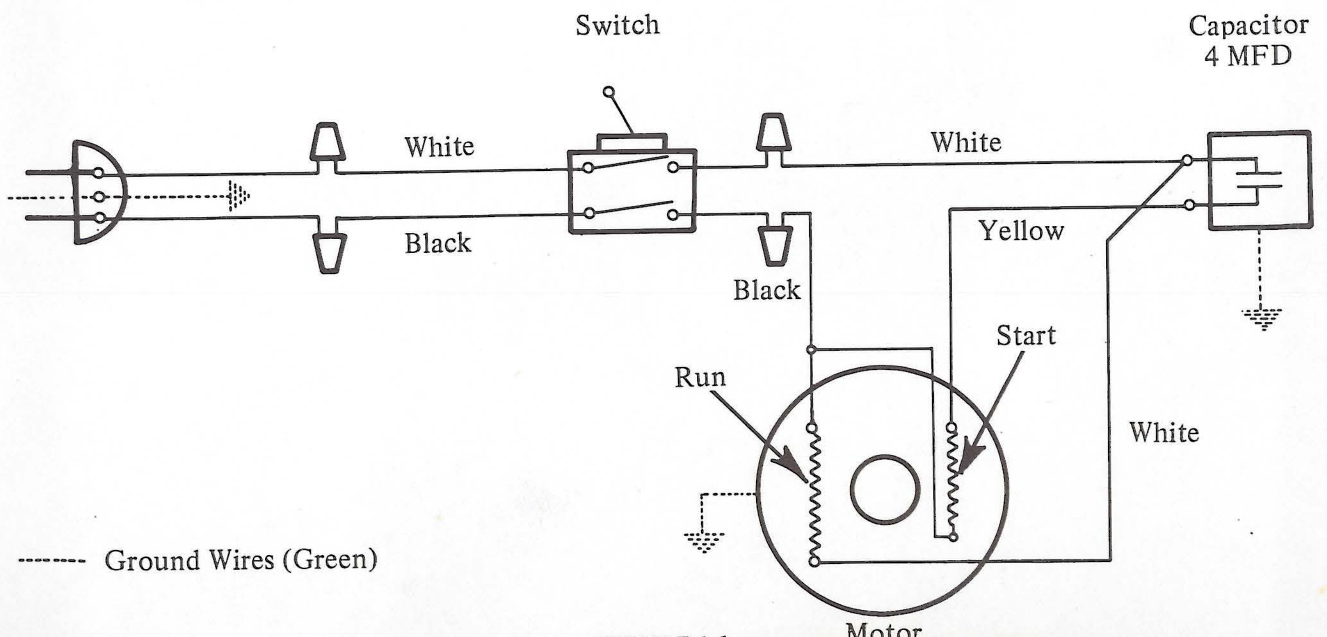


FIGURE 1-1

CYCLE CLUTCH

Because of heavier operating loads the "Selectric" Composer uses a dog clutch rather than a spring clutch to drive the cycle shaft. The action of the clutch is similar to the action of the clutch that drives the operational cams. A pawl, which is secured to the cycle shaft, is thrown into engagement with ratchet teeth on the rotating cycle clutch pulley. The pawl functions to make and break the driving connection between the cycle clutch pulley and the cycle shaft. The engage-disengage action of the pawl is controlled through a cycle clutch release mechanism in the keyboard.

The cycle clutch pulley mounts in the center bearing and connects with the operational shaft exactly the same as on the "Selectric" Typewriter. The cogged portion of the pulley, where the drive belt rides, is slightly wider than the base machine's. A wider drive belt is needed because of the heavier motor and operating loads. From Figure 2-1 you can see that the inner periphery of the pulley contains the ratchet teeth that are used to drive the cycle shaft.

The pawl that engages the ratchet teeth is called the cycle clutch drive pawl. It mounts on a stud on the cycle clutch pawl carrier. A "C" clip holds it on this stud. The pawl carrier is secured to the right end of the cycle shaft by two large bristo screws. A heavy extension spring anchored to a lug on the pawl carrier loads the pawl clockwise into the ratchet teeth on the pulley.

A two-stepped cycle clutch sleeve, which is mounted freely about the right end of the pawl carrier, performs a similar function to the cycle clutch sleeve on the "Selectric" Typewriter. It controls the engaging and disengaging action of the drive pawl with the ratchet teeth of the pulley.

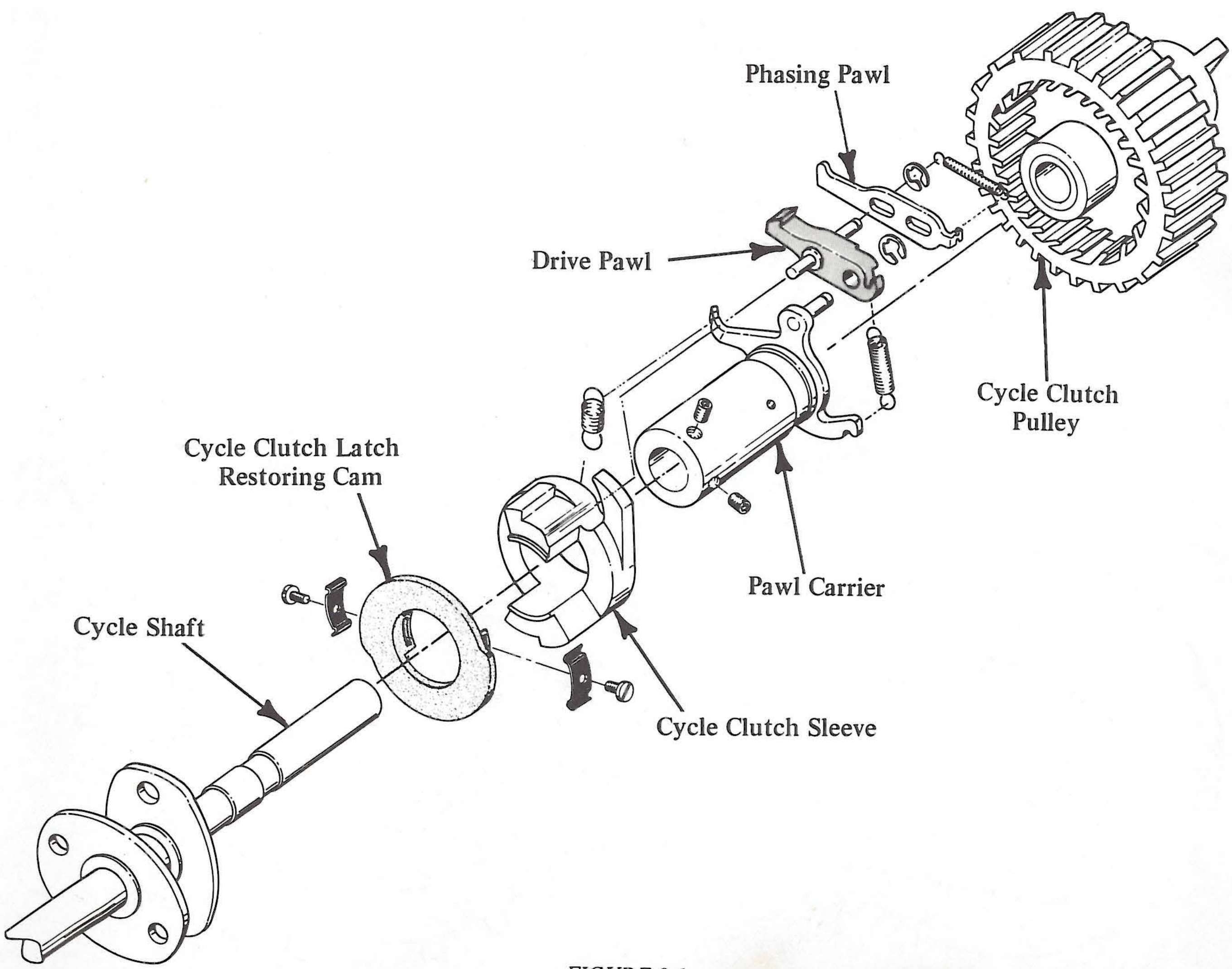


FIGURE 2-1

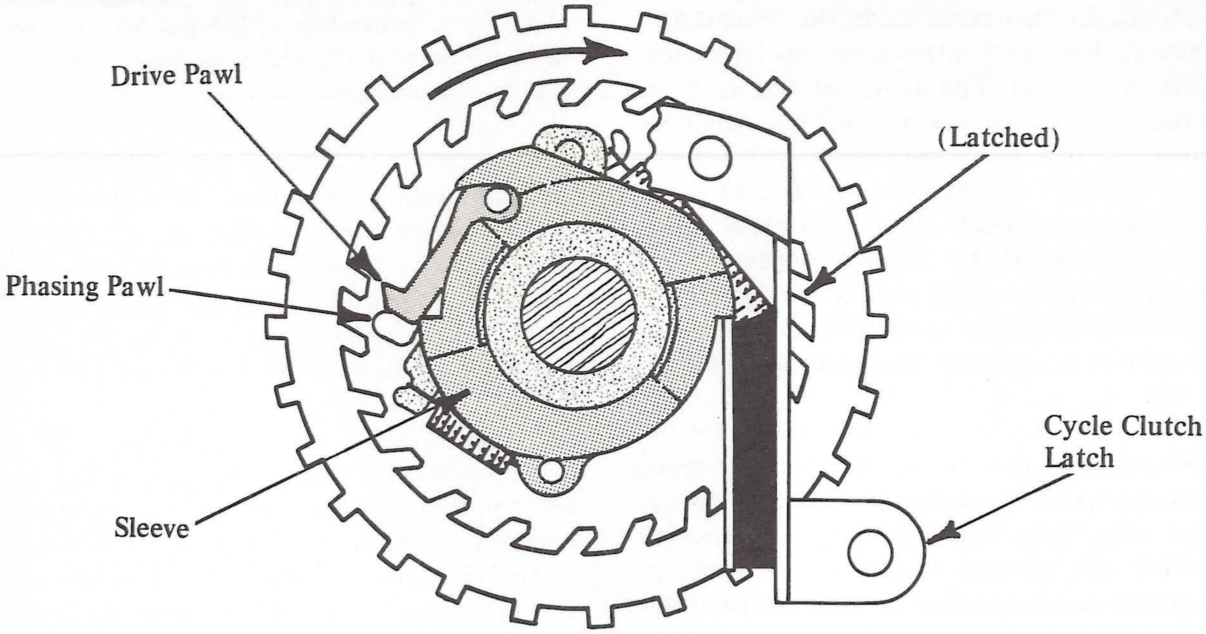


FIGURE 2-2A

When the sleeve is held latched by the cycle clutch latch, as shown in Figure 2-2A, the drive pawl is held disengaged from the teeth in the pulley by a hook shaped lug on the sleeve. A small pin anchored to the drive pawl projects into the angled slot of this hook shaped lug.

An extension spring fastened to a stud on the sleeve and anchored to a lug on the pawl carrier loads the sleeve clockwise (release direction). When the cycle clutch latch is disengaged from the step on the sleeve this extension spring rotates the sleeve clockwise causing the drive pawl to be released (Fig. 2-2B). The drive pawl is then spring driven into engagement with the ratchet teeth on the pulley.

Because the release of the drive pawl is random with respect to the rapidly moving ratchet teeth a means must be provided to control the entry of the drive pawl into the ratchet teeth. This is the function of the phasing pawl. It times the entry of the drive pawl into the ratchet teeth. It assures that the drive pawl always has enough time to fully engage the ratchet before the driving action begins.

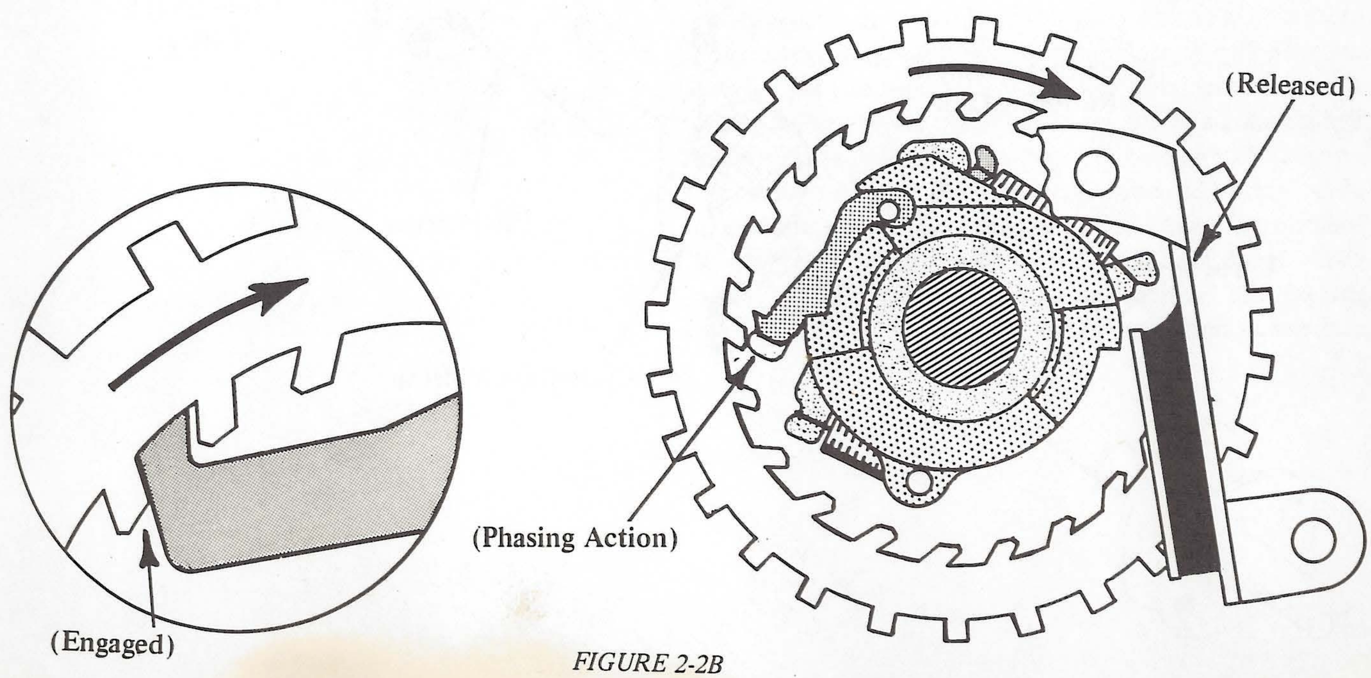


FIGURE 2-2B

The phasing pawl mounts alongside the drive pawl. The phasing pawl mounts, at the rear, to a pin on the drive pawl, and at the front, to the same stud that mounts the drive pawl to the carrier. The mounting holes in the phasing pawl are elongated so that it can slide forward ahead of the drive pawl. A small extension spring loads it forward into its phasing position.

The phasing pawl simply functions as a sensor. If the drive pawl does not have adequate time to engage the ratchet to its full depth before a ratchet tooth begins to drive it, the phasing pawl will sense this and hold the drive pawl out, making it wait for the next ratchet tooth. This action is illustrated in Figure 2-2B. As the ratchet rotates the phasing pawl guides the drive pawl into the next ratchet tooth. The phasing pawl is driven back on its elongated mounting holes as the ratchet tooth engages the drive pawl (see insert in Figure 2-2B). The phasing pawl eliminates nipping, clutch slippage, and keeps wear on the drive pawl and ratchet to a minimum.

When the cycle clutch latch is restored into the path of the step on the cycle clutch sleeve the sleeve is stopped and the drive pawl is disengaged from the ratchet teeth on the pulley. The overthrow of the cycle shaft is limited by the nylon cycle clutch latch restoring cam in the same manner as on the standard machine. The restoring cam is anchored to the pawl carrier by two screws and clamps. As the cycle shaft attempts to overthrow, the restoring cam strikes projections of the cycle clutch sleeve causing the cycle shaft to be stopped.

The adjustments of this clutch are much simpler to make and understand as compared to the spring clutch. There are only two adjustments: pawl clearance and cycle shaft overthrow. With the cycle clutch sleeve latched and the cycle shaft backed up against the check pawl the pawl carrier is loosened and then advanced or retarded to decrease or increase the pawl clearance. The bristo screws in the pawl carrier are located so that they are accessible when the cycle shaft is at rest. Once the proper pawl clearance is gained the overthrow stop is adjusted in the same manner as on the standard machine.

KEYBOARD

The letter keyboard on the "Selectric" Composer is relatively the same as on the "Selectric" Typewriter. Besides being "anti-flick", the "Selectric" Composer keyboard differs only in that it is also used to generate the proper escapement selection for each character. The principles of operation still remain practically the same. That is, depression of a letter keylever positions an interposer in the path of the filter shaft and initiates the cycle clutch release operation. Driving the interposer forward with the filter shaft sets up the proper tilt and rotate selection for that character just as it does on the base machine.

In the "Selectric" Composer keyboard there are two other mechanisms which are directly involved in the interposer operation. These are the escapement control mechanism and the velocity control mechanism. Both of these mechanisms will be explained in detail under their own sections of this manual. In this section our objective is only to acquire a good understanding of how an interposer is operated and how its operation is used to produce the escapement selection, velocity selection, and typehead selection.

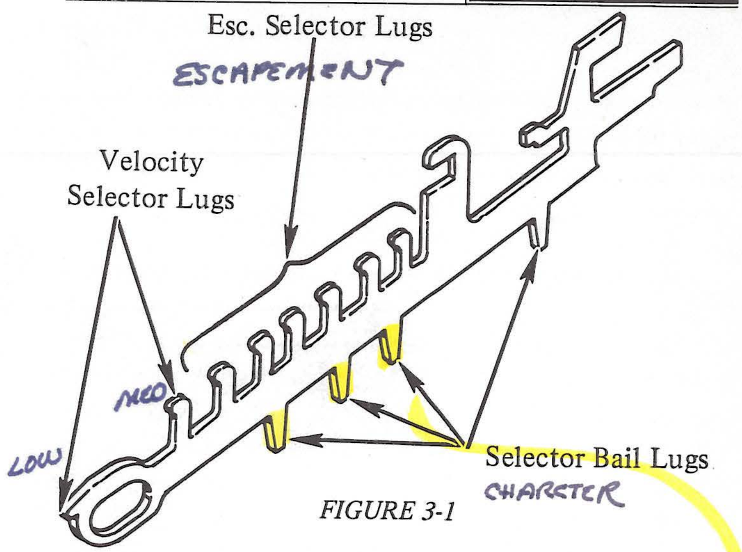


FIGURE 3-1

1. Interposer Operation

Because of the escapement and print velocity selection the interposer used in the "Selectric" Composer keyboard has a greater number of operating surfaces than the interposer used in the "Selectric" Typewriter. Looking at Figure 3-1, the selector bail lugs located

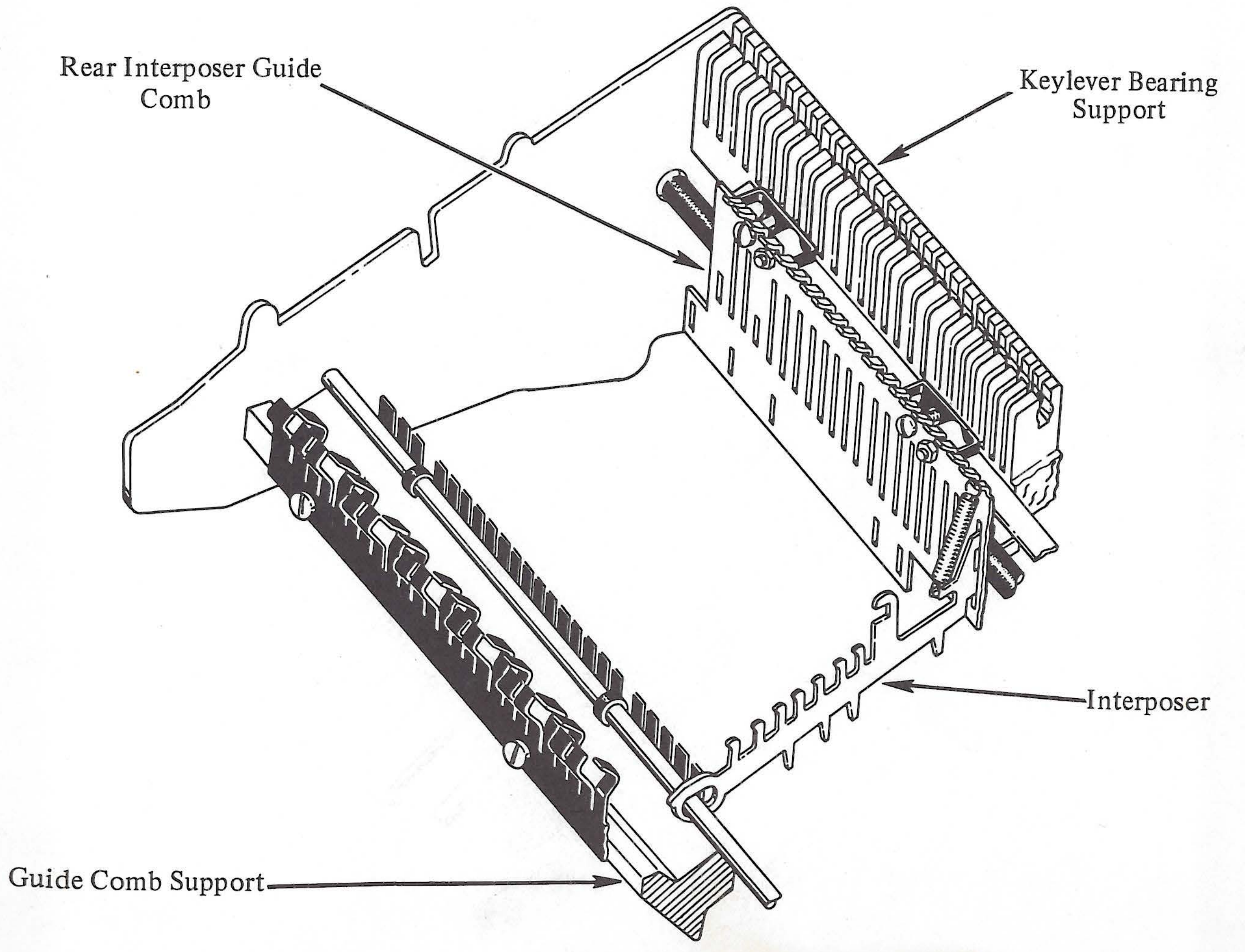


FIGURE 3-2

along the bottom of the interposer are used for typing element selection exactly the same as in the base machine. The number and position of these lugs on each interposer, like on the base machine, designates what character on the typing element will be selected for a print operation. Except for this coding of the selector bail lugs, as you will see shortly, all interposers in the "Selectric" Composer keyboard are identical.

Located along the top of every interposer are seven selector lugs (Fig. 3-1). The first six lugs, starting at the rear, are used for escapement selection. The coding for the escapement selection is achieved through coded bails that are operated by these lugs. The seventh or most forward lug in this group functions to actuate a coded bail for the selection of a medium velocity print operation. A low velocity print operation is achieved through a coded bail that extends across the forward tip of the interposers the same as on the standard machine. In summary, an interposer is used to actuate any combination of six selector bails for typing element selection, actuate any one of the six escapement code bails for escapement selection, and actuate either one of the print control bails for the selection of either a medium, or low velocity print operation.

The interposer mounts in this keyboard in the same manner as it does in the "Selectric" Typewriter. The forward end of the interposer is supported by the front interposer guide comb which is fastened to the back face of the guide comb support. A large fulcrum rod passing through the elongated hole in the interposer secures it to the guide comb (Fig. 3-2). The elongated hole in the interposer permits the interposer to slide front and rear. The rear portion of the interposer is supported by the rear interposer guide comb which is mounted on the front face of the keylever bearing support. The interposer is spring loaded up and towards the rear by an extension spring. The selector compensator tube mounts between the guide comb and the keylever bearing support the same as in the base machine.

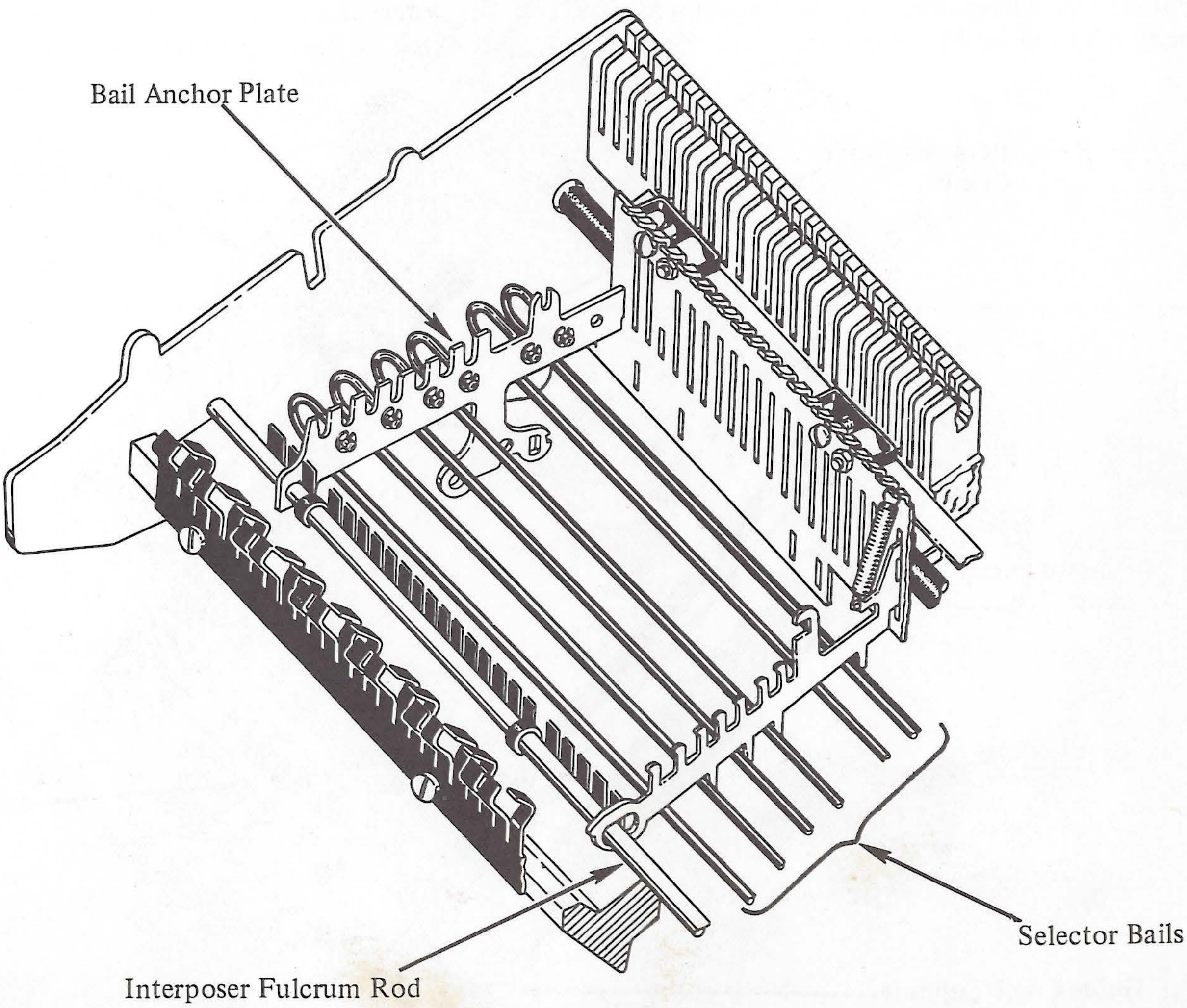


FIGURE 3-3

Mounted at each end of the front and rear interposer guide combs are the bail anchor plates. These plates support the six selector bails, the six escapement bails, and the medium and no print velocity code bails. Each bail anchor plate is supported at the rear by the rear interposer guide comb (Fig. 3-3). The rear of both anchor plates fit into rectangular slots in this guide comb. The forward ends of the bail anchor plates project through slots in the front interposer guide comb. The same fulcrum rod that passes through the elongated holes of the interposers passes through a hole in the forward end of each bail anchor plate. The fulcrum rod serves to lock the plates in position (Fig. 3-3).

The six selector bails used for tilt and rotate selection are mounted and pivot on these bail anchor plates as shown in Figure 3-3. "C" clips on the left hand end of the bails (located on the inside face of the bail anchor plate) secure the bails in position. Although the mounting of these bails differs from the "Selectric" Typewriter, the operation is exactly the same. Their purpose is to carry the interposer motion to the selector latches in the differential mechanism.

The six escapement code bails and the medium velocity code bail are mounted and pivot on the bail anchor plates as shown in Figure 3-4. Because the

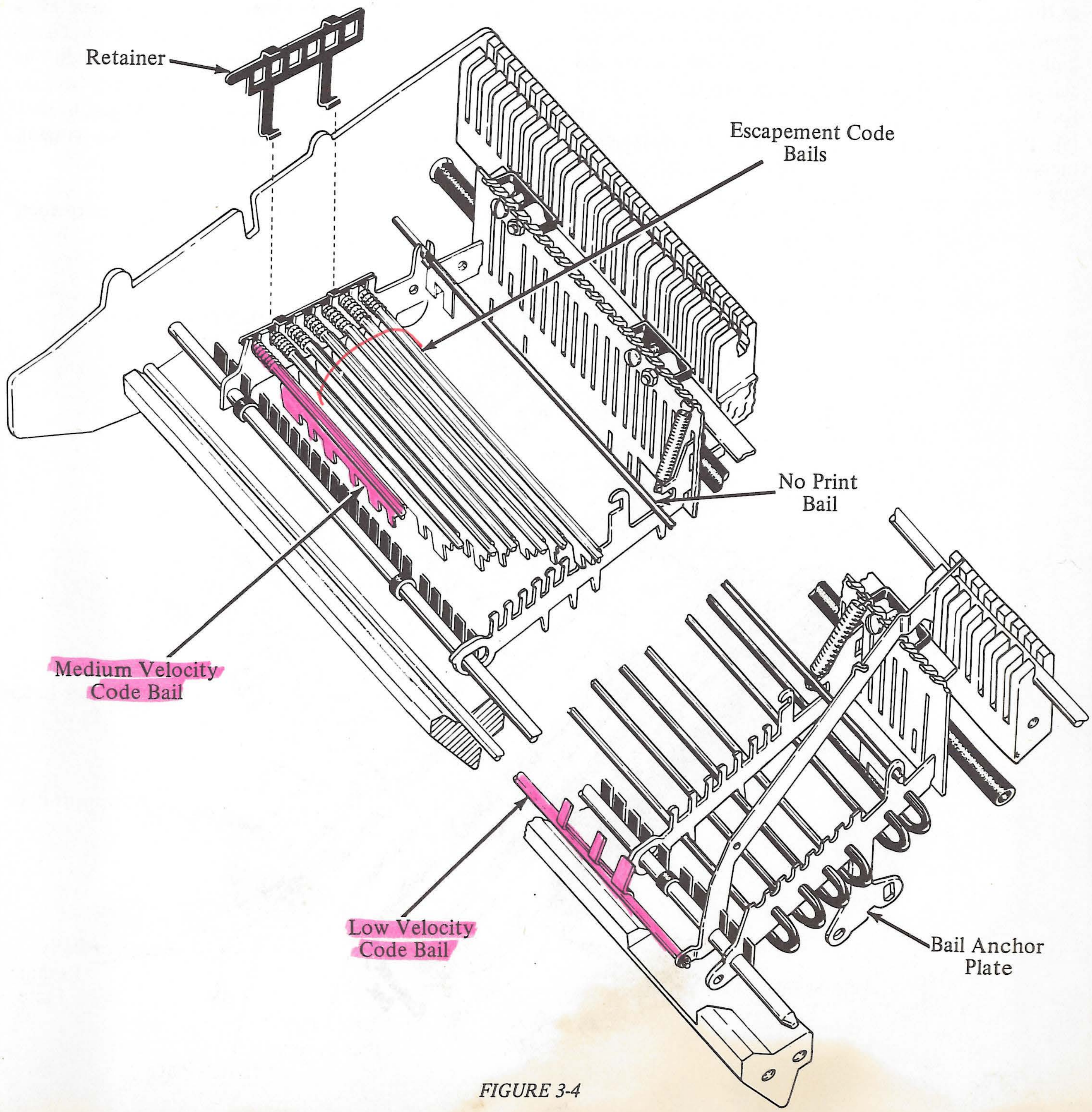


FIGURE 3-4

pivot holes are open at the top, a retainer is used on the left hand bail anchor plate to hold the code bails down. The retainer is designed so that it clamps to the anchor plate. The right hand anchor plate does not require a retainer because the code bails are held down in their slots by an adjustable bearing plate fastened to the inner face of the right hand keyboard sideframe. (This is not shown in the illustration.) The compression spring located at the left end of each code bail loads the code bails towards the right (Fig. 3-4). The reason for this spring loading will be explained under the appropriate section.

The low velocity bail mounts along the top surface of the guide comb support directly in front of the forward tip of the interposers. The left hand end of this bail extends through a hole in the left hand keyboard sideframe. This hole functions as the bearing point for the left end of the bail. The right hand end of the bail pivots in a support which is part of the spacebar mechanism (Fig. 3-4). A "C" clip at the right end secures the bail laterally.

The keylever mounts in the keyboard and functions in the same manner as it does in the keyboard of the base machine (Fig. 3-5). The keylever is different only in that it doesn't have a keylever pawl. Instead, it has a lug similar to a Model C keylever. Positioned directly beneath this lug is a pawl which is mounted to the interposer. This pawl is called the interposer latch pawl. It performs five different functions in the keyboard operation.

a. Operates as a link between the keylever and the interposer.

b. Serves as a latch to hold the interposer down into its active position.

c. Serves as a trigger to unlatch the cycle clutch.

d. Functions similarly to a keylever pawl in that it prevents a repeat operation from occurring if the keylever is held depressed.

e. Plays a functional role in the keyboard lock mechanism.

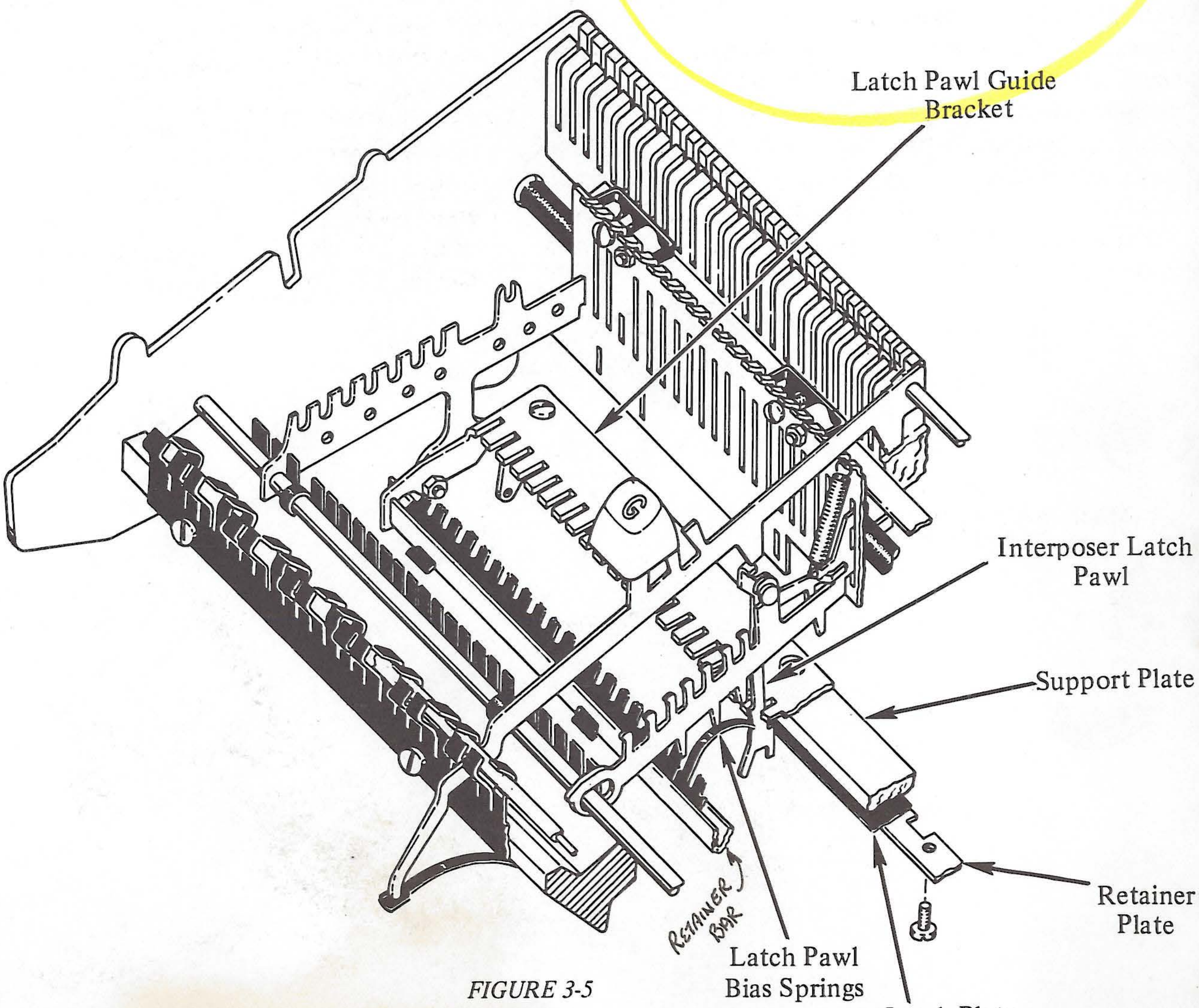


FIGURE 3-5

FIGURE 3-5

All of these operations will be explained in detail in this section.

A shouldered rivet on the right hand face of the latch pawl operates freely in a slot in the large vertical lug of the interposer. The arm of the pawl that extends towards the rear along the top of the interposer has two functions. It straddles the interposer to give the pawl stability and it limits how far the pawl can be cocked counterclockwise about its mounting rivet (Fig. 3-5). The lower portion of the latch pawl receives its left to right stability from guide slots located along the forward edge of the latch pawl guide bracket. This bracket, which runs the width of the letter keyboard, fastens to the bottom of each bail anchor plate by two screws.

Along with acting as a guide comb for the latch pawls, the latch pawl guide bracket serves as a mounting bracket for the support plate. This support plate has two functions. It carries the latch plates which provide the latching surface for the latch pawls. It also carries the cycle clutch release mechanism. The support plate is a heavy rectangular bar fastened to the underside of the latch pawl guide bracket by four screws. These screws, which are located on the top surface of the guide bracket, thread directly into the support plate. The latch plates, which are made in two sections, are sandwiched between the bottom of the support plate and a retainer plate (Fig. 3-5). Screws passing through both the retainer plate and the latch plates thread into the support bar from the bottom side.

The latch plates, which are thin metal strips, are positioned so that their front edges project forward from the front face of the support bar. The latch pawls, in their rest position, are loaded against the forward edge of the latch plates by a row of spring fingers called latch pawl bias springs. These spring fingers are anchored to a "U" shaped retainer bar. Each end of this retainer bar fits into a hooked portion of the latch pawl guide bracket (Fig. 3-5). The combined tension of all the spring fingers, loading their individual latch pawls, holds this retainer bar in position.

Each spring finger, which bites into a small notch in its respective latch pawl, loads the latch pawl towards the rear. This keeps the bottom of the latch pawl loaded against the forward edge of the latch plate and the top of the latch pawl biased towards the rear. This biasing causes the shouldered rivet on the latch pawl to remain at the rear of the slot in the interposer, thereby assuring that the latch pawl will be positioned directly beneath the lug on the keylever (Fig. 3-6A).

When a keylever is depressed the lug on the keylever pushes on the top surface of the latch pawl. As the latch pawl moves down it carries with it the interposer. As soon as the latch pawl has moved down far enough to properly position the interposer in front of the filter shaft, the latching surface located near the bottom of the latch pawl will have moved down beyond the latch plate. The latch pawl will then swing to the rear latching itself under the latch plate (Fig. 3-6B). This latching action is supplied by the latch pawl bias spring. The interposer is now held

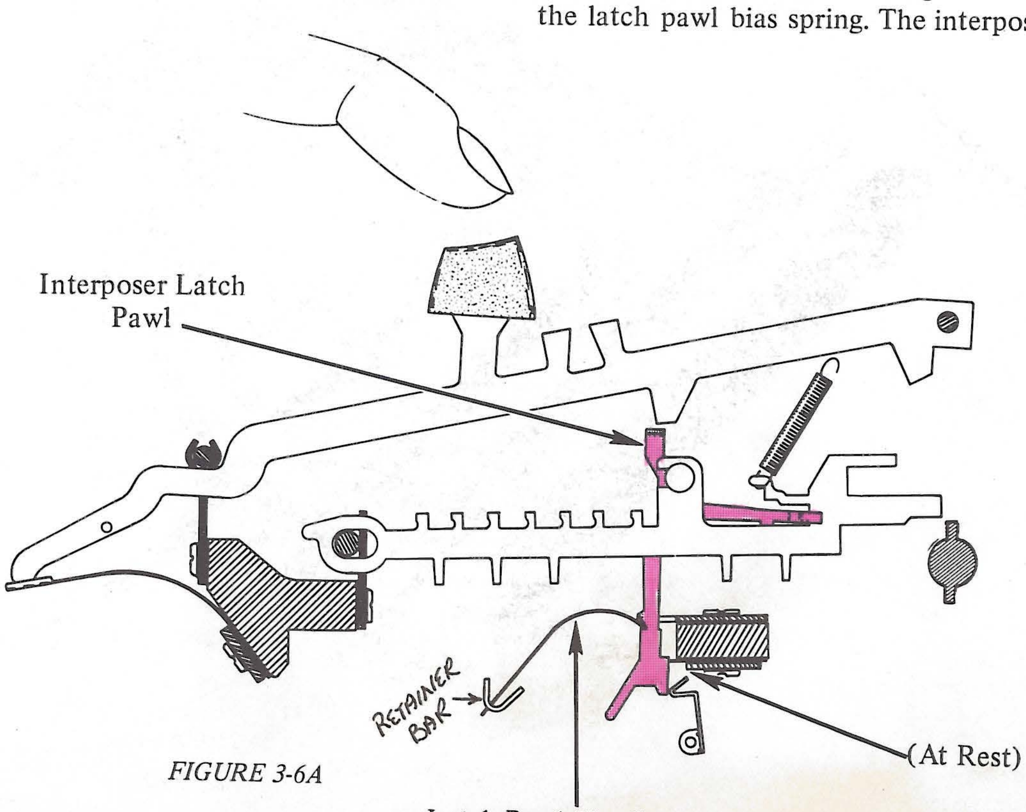


FIGURE 3-6A

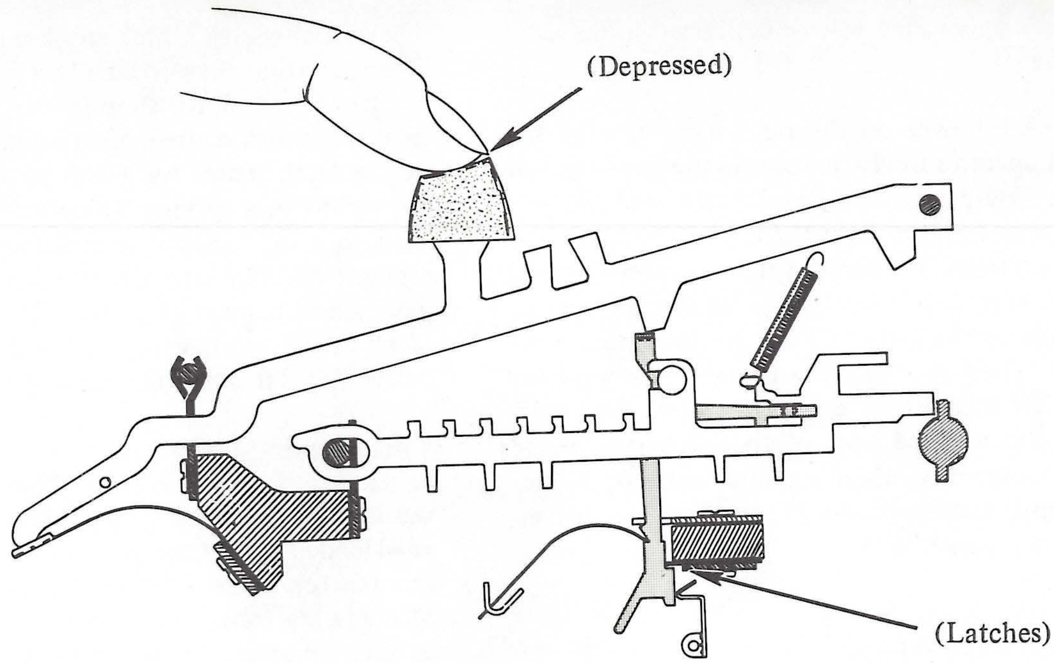


FIGURE 3-6B

down into the path of the filter shaft. In the latched position the interposer has penetrated the selector compensator tube locking out all of the other interposers the same as it does on the base machine.

The latching action of the latch pawl provides the motion necessary to produce a cycle clutch release. A vane resting directly behind the latch pawl is rotated by the latch pawl as the pawl swings under the latch plate. Rotation of this vane is used to develop the cycle clutch release operation. This is the action that makes the keyboard "anti-flick". The cycle clutch cannot be released unless the interposer is latched into the path of the filter shaft. Cycle clutch release will be explained later in this section.

The amount of bite that the latch pawl takes on the latch plate when it latches is controlled by the upper arm of the latch pawl contacting the underside of the spring lug on the interposer. Because of this, as soon as the interposer begins to move forward (driven by the filter shaft) it will carry the latch pawl with it.

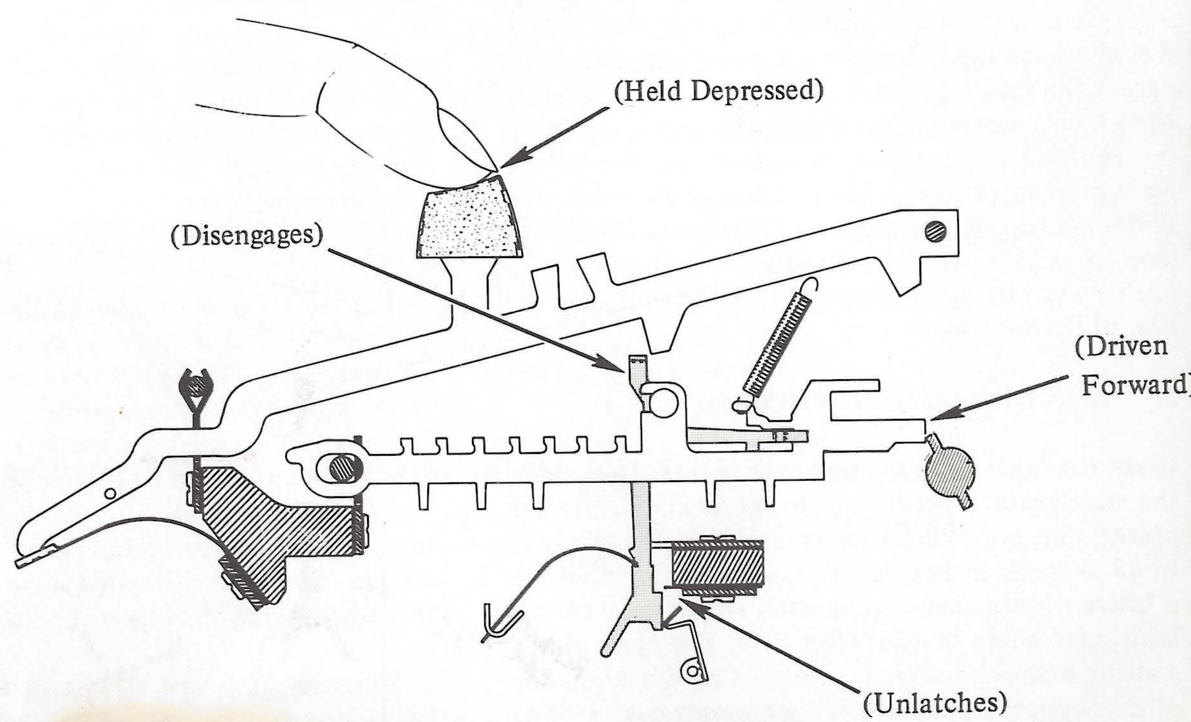


FIGURE 3-6C

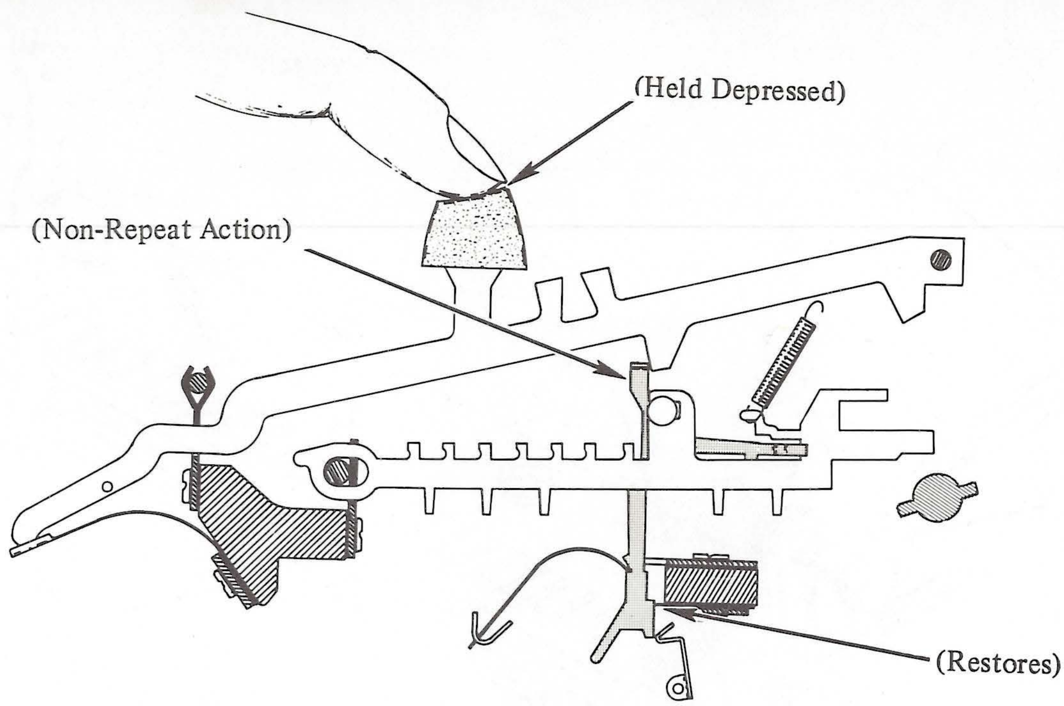


FIGURE 3-6D

This will cause the latch pawl to slide forward disengaging itself from the latch plate (Fig. 3-6C). The interposer is now free to restore to its rest position.

Figure 3-6D illustrates the action that occurs if the keylever is held depressed throughout a cycle. In the early portion of the cycle, when the interposer is driven forward by the filter shaft, the latch pawl is carried forward not only out from under the latch plate but also out from under the lug on the keylever. The interposer is then free to restore to its rest position. As it restores the top of the latch pawl contacts the front edge of the lug on the keylever. This restricts the latch pawl from following the interposer back to rest. Once the keylever is permitted to restore, the top of the latch pawl snaps to the rear positioning itself back beneath the lug on the keylever (Fig. 3-6A). The latch pawl is now ready to be depressed again. It is the latch pawl bias spring that provides the restoring action to the latch pawl.

2. Cycle Clutch Release and Restoring

When the latch pawl swings to the rear to latch under the latch plate, it pushes on the cycle clutch trip bail causing the cycle clutch to be released. The trip bail, which is made in two sections, mounts and pivots on a fulcrum wire that is supported at each end by the latch pawl guide bracket (Fig. 3-7). The cycle clutch control bracket, which is mounted on the underside of the support bar by two screws, provides support to the fulcrum wire at the center. A "C" clip on the fulcrum wire on each side of this center support retains the fulcrum wire in position.

When either section of the trip bail is pushed to the rear by a latch pawl, it pushes on the control latch push link. This link, which is flat, mounts freely on a stud on the upper arm of the cycle clutch control latch. The forward end of the link sets into the V-shaped groove on the backside of the trip bails. The push link is located in the center of the keyboard where the two trip bails meet (Fig. 3-7). The push link serves to transfer the trip bail motion to the cycle clutch control latch. This latch mounts and pivots on a stud on the control bracket. An extension spring running between the bracket and the control latch loads the control latch and trip bails into their rest position.

The function of the control latch is to latch the cycle clutch control lever in its rest position until an interposer has been positioned in front of the filter shaft. The cycle clutch control lever mounts and pivots on a stud on the cycle clutch control bracket (Fig. 3-7). A link connected to the upper arm of this control lever fastens to the bottom of the cycle clutch latch. An extension spring loads the control lever in the direction that will produce a pull on the release link when the control lever is unlatched.

When the machine is at rest the control lever is latched at rest by the control latch; thus the cycle clutch latch is held in position under the step on the

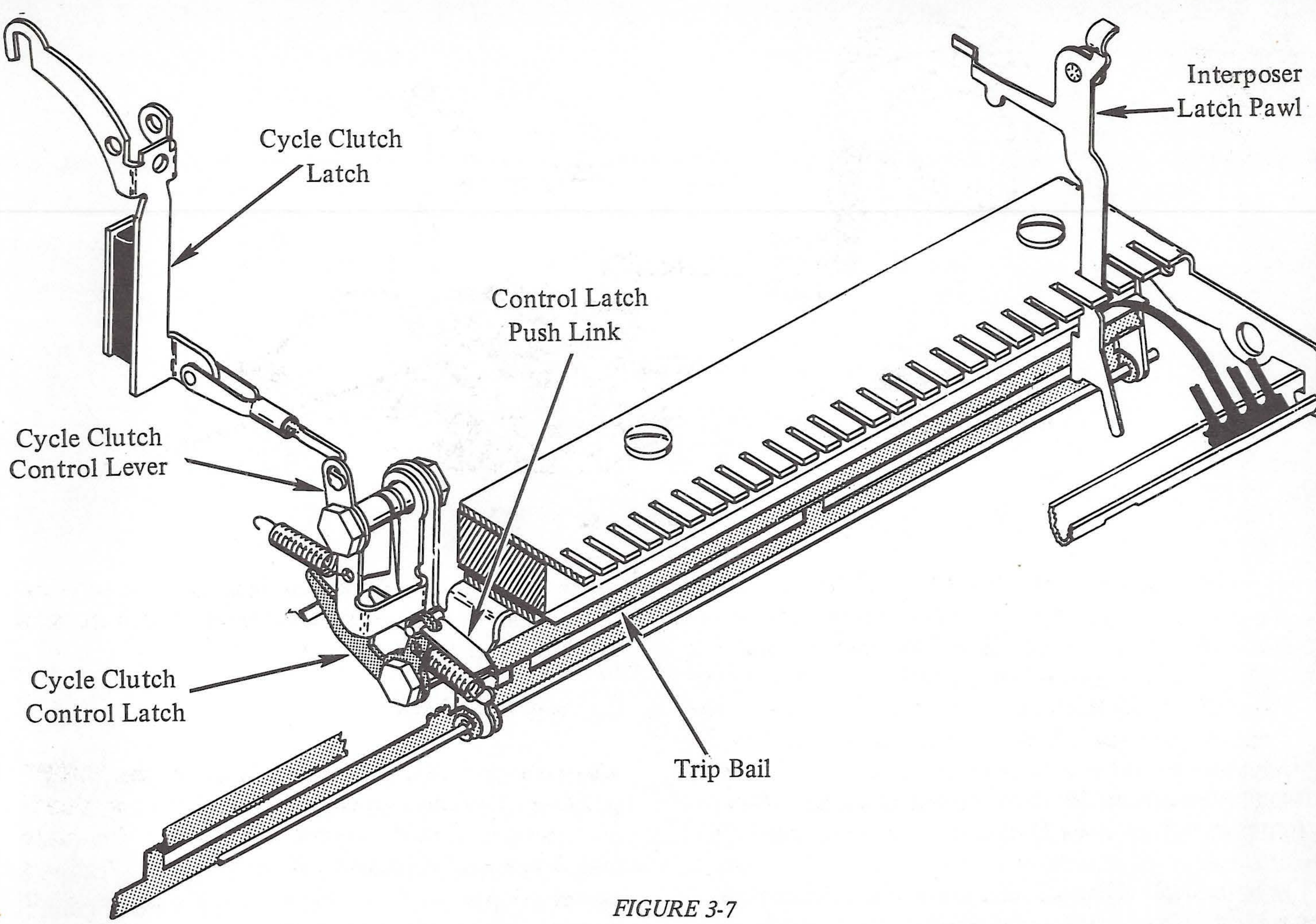


FIGURE 3-7

cycle clutch sleeve (Fig. 3-8A). Depressing a keylever causes a latch pawl to push the top of the trip bail towards the rear. This bail then pushes on the control link causing the control latch to rotate down releasing the control lever. The control lever spring then rotates the control lever producing a pull on the release link.

The pull on the link pivots the cycle clutch latch out from under the step on the sleeve and a cycle clutch release is achieved (Fig. 3-8B).

The cycle clutch latch restoring mechanism is the same as on the "Selectric" Typewriter. A roller on the

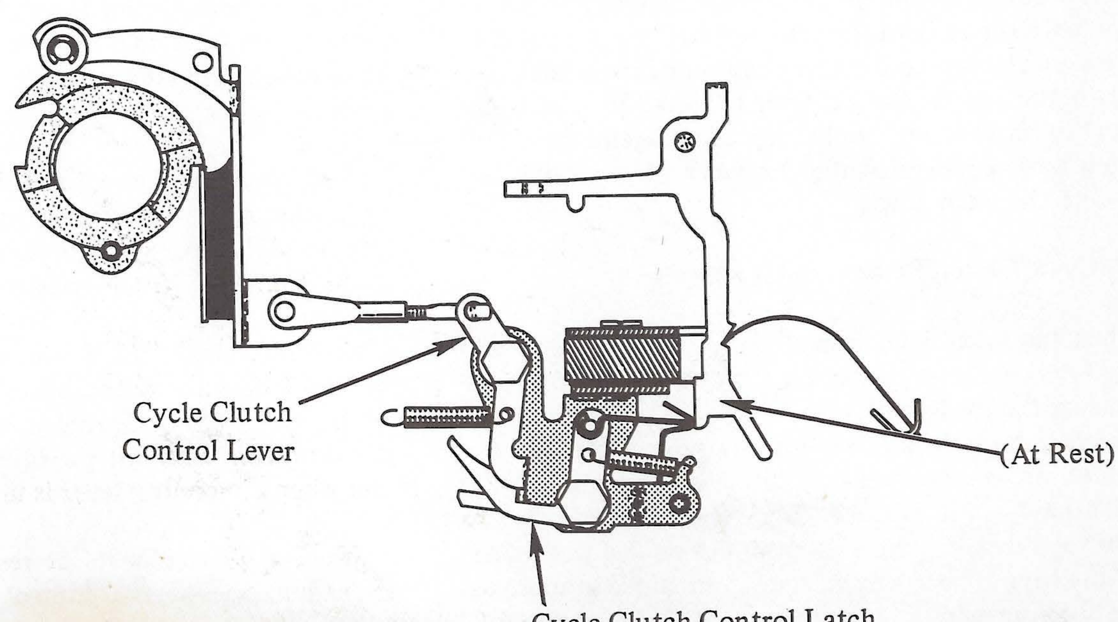


FIGURE 3-8A

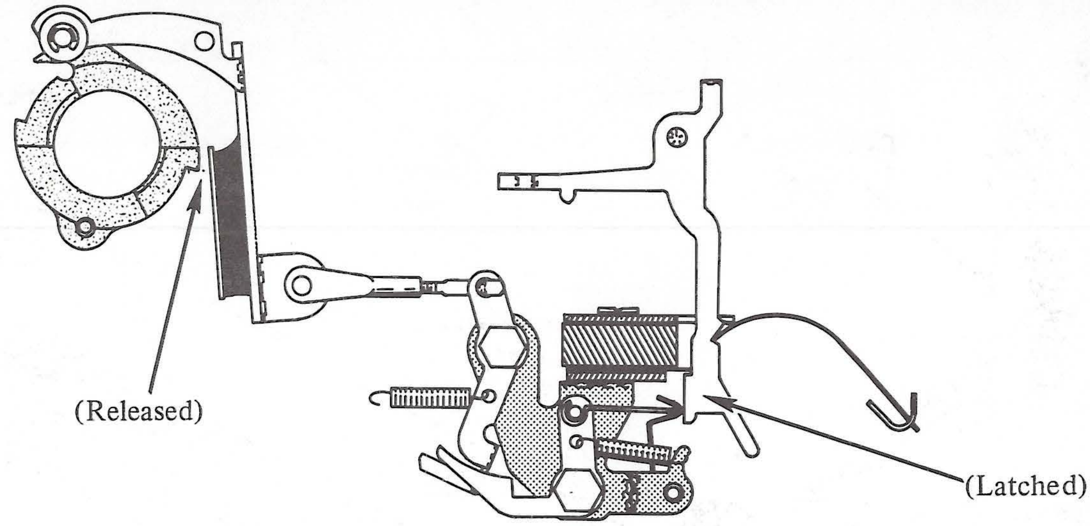


FIGURE 3-8B

upper arm of the cycle clutch latch rides on a restoring cam which is mounted on and rotates with the cycle shaft. As the roller follows the cam towards the high point, during the latter portion of a print cycle, the cycle clutch latch swings back into the path of the step on the sleeve. This restoring action pulls on the release link which rotates the control lever back to its latched position. By the time this restoring action begins, the latch pawl that produced the release operation has already restored to its rest position. Therefore, unless a second interposer has been placed in storage, the control latch, which is spring loaded into its latching position, is prepared to relatch the control lever once it has been driven back to its rest position. If an interposer has been placed in storage, then the cycle clutch will continue to drive into the next cycle without being interrupted, the same as it does on the base machine.

3. Keyboard Lock

When the ON-OFF switch is placed in the "OFF" position, the letter keyboard is conditioned so that if an operator should depress a keylever, the cycle clutch will not be released and the interposer that was depressed will not be placed in storage. This is accomplished by pivoting a bail into position directly behind the lower extension of the latch pawls (Fig. 3-9A). With the bail in this position, the extension of the latch pawl which is angled with respect to the line

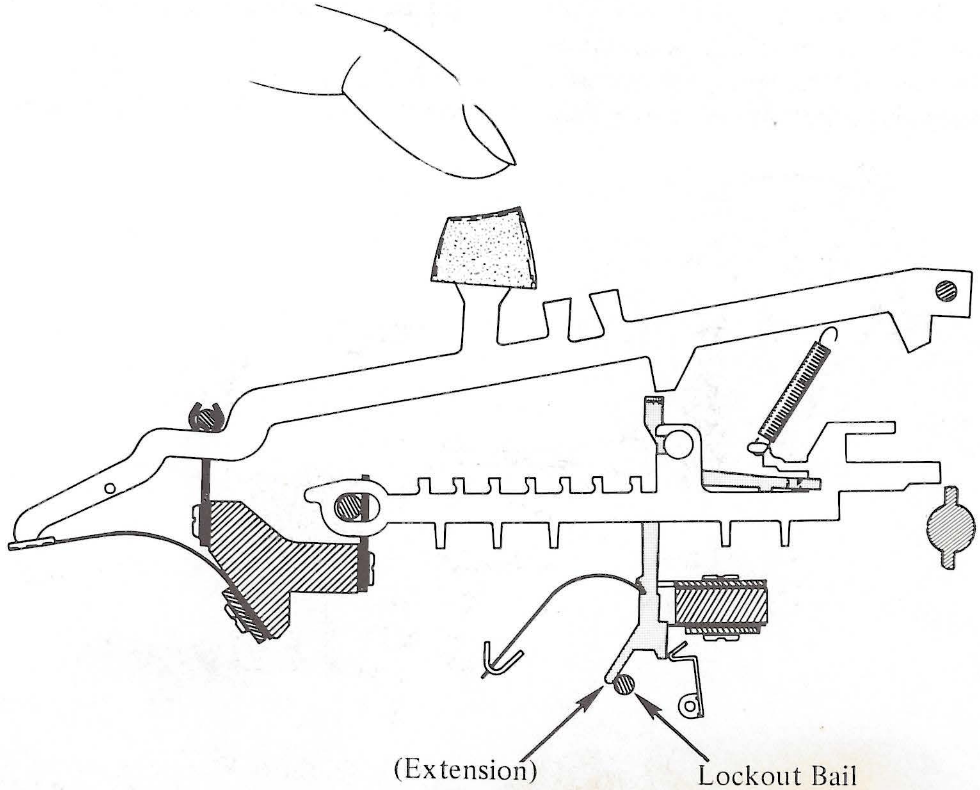
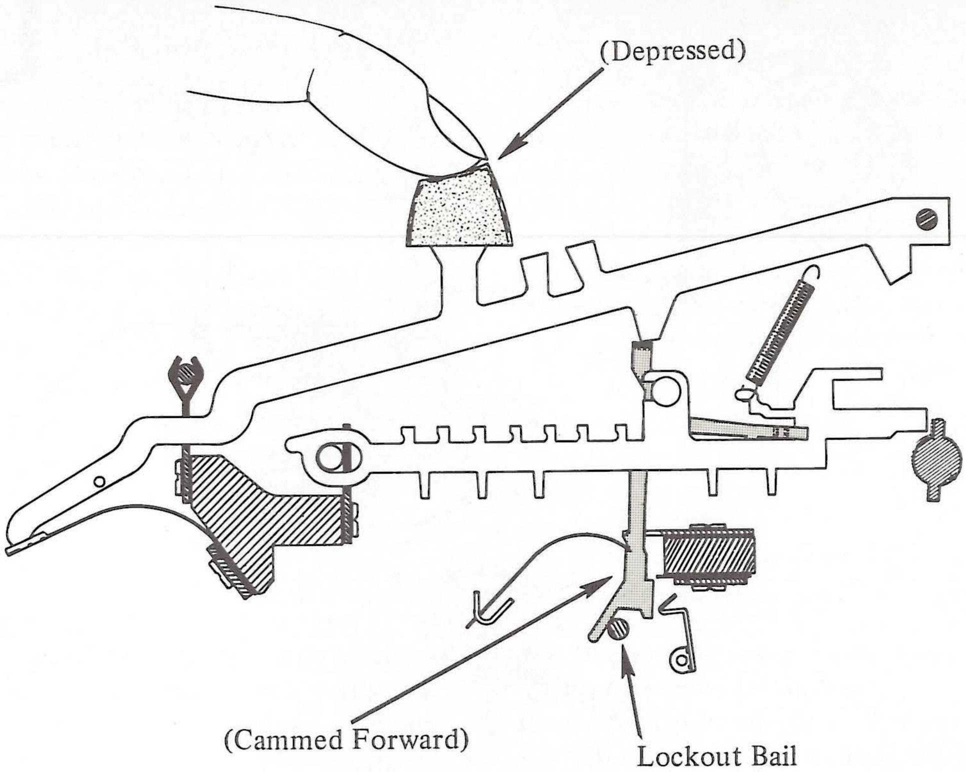


FIGURE 3-9A

FIGURE 3-9B



of motion will ride against the bail as the latch pawl moves down (Fig. 3-9B). Thus, the latch pawl is cammed forward preventing it from latching under the latch plate and releasing the cycle clutch.

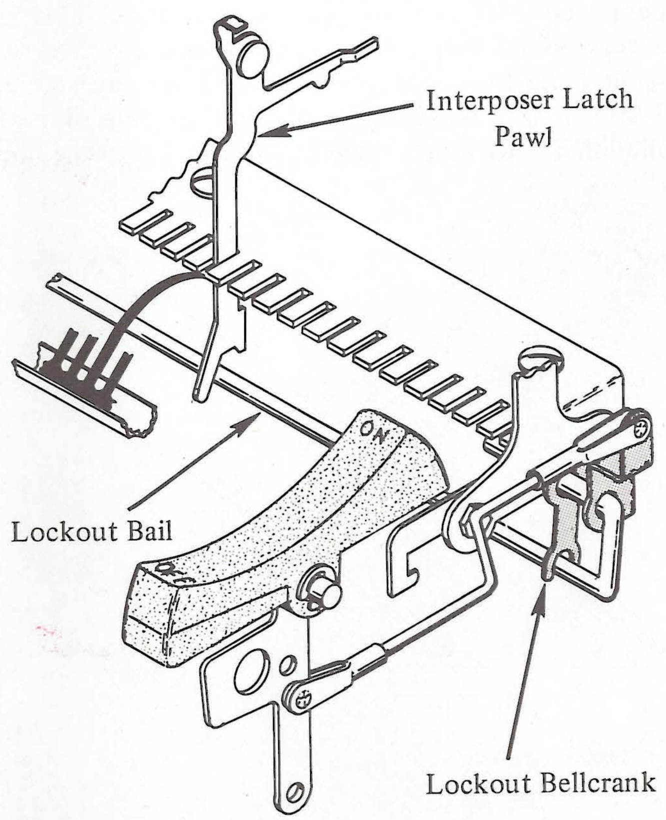


FIGURE 3-10

The lockout bail mounts in pivot holes at each end of the latch pawl guide bracket (Fig. 3-10). A retaining clip on the left end of the bail, outside the guide bracket, controls the end play of the bail. The lockout crank, located at the right hand end of the bail, is used to operate the bail. A link connected between the lower extension of the ON-OFF switch and the lockout bellcrank carries the motion from the switch to the bail.

PRINT

The most important single item that defines quality of printing is the aesthetics or graphic design of the type font. This design is an art whose success or failure hinges on the judgment of the artist. He must consider the appearance of each character as it stands alone, as well as the appearance of each character when it becomes part of a word entity. He must also consider the horizontal and vertical proportions of each character as related to every other character.

The real yardstick of success in printing is, "How well does the machine reproduce the artist's work?" On the "Selectric" Composer, which operates on the direct image process, there are many factors that must be considered in attaining a quality image. Factors such as ribbon ink release characteristics, ribbon thickness, paper receptiveness, paper surface finish, sub-surface structure of the paper, platen hardness, typing element alignment, typing element impact velocity,

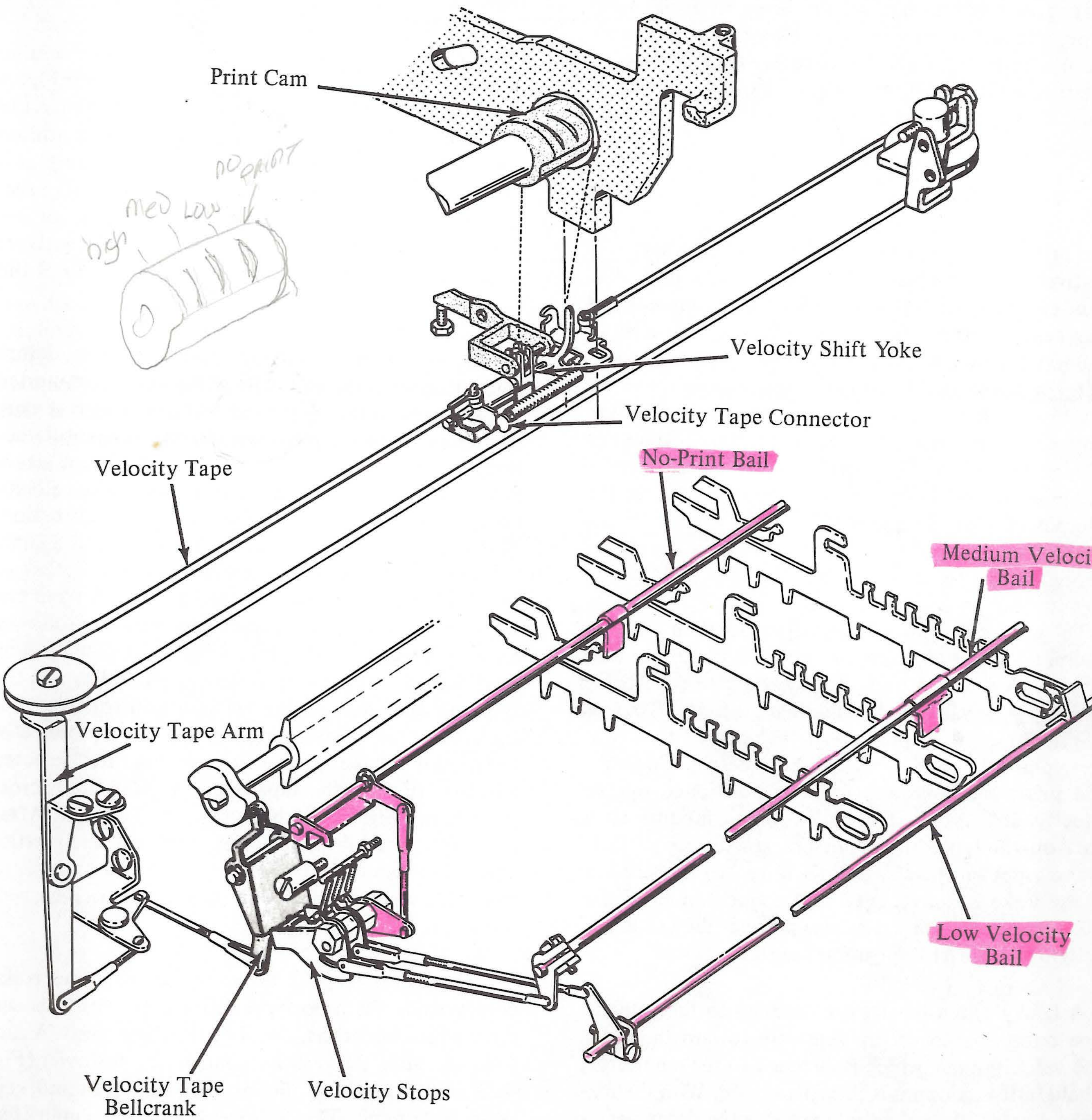


FIGURE 4-1

etc., all directly affect the quality of the print. These factors are instrumental in controlling such characteristics as color intensity, color balance, edge definition, line spread, embossing, flaking, smearing, and ink coverage. A comprehensive explanation of these factors and characteristics are described in the applications booklet.

To more closely balance the print quality characteristics between all of the characters on the typing element each character has been classified according to its impact requirements. The factors considered when classifying each character were its facial area, shape, and ability to penetrate. Every character, considering both upper and lower case, has been assigned to either a high, medium, or low velocity print operation. The velocity for each individual character is developed within the keyboard.

1. Velocity Selection

The print mechanism on the "Selectric" Composer is relatively the same as that of the base machine. The main difference is that the "Selectric" Composer has four velocity selections instead of two, thus a more elaborate selection mechanism is needed. A tape and pulley system, similar to that found in the tilt and rotate mechanism, is used to control the position of the print cam follower roller under the different tracks of the print cam (Fig. 4-1). As in the base machine, velocity selection originates through the operation of the interposers. Also, like the base machine, the mechanics of shifting the print cam follower roller is developed through a cam on the filter shaft.

The print cam, which is slightly wider than the base machine's, has four camming surfaces which are usually referred to as "tracks". From left to right these four tracks are designated as high, medium, low, and no-print tracks. The purpose of the no-print track will be explained under the section "No-Print Control". The print cam follower roller is positioned by the velocity shift yoke. This yoke, which mounts on a shaft on the tab cord anchor bracket, is free to slide left or right on the shaft. Set-screwed to the left end of the yoke is the velocity tape connector. Both the yoke and connector act as one piece as they slide laterally on the shaft to position the roller.

A heavy extension spring fastened to the velocity tape connector loads this assembly toward the right. The velocity tape, which is fastened to the connector, is held taut as it opposes this spring load. With the machine at rest, the velocity tape holds the slider assembly in its extreme left position so that the print cam follower roller is aligned with the high velocity lobe on the print cam. Therefore, by merely paying out the velocity tape, the roller can be shifted laterally across the tracks on the print cam until it is aligned with the selected track. Once the roller has been shifted to the proper track, it is trapped in this position by the velocity control detent (Fig. 4-2). This detent assures that the roller will be in its selected position by the time the print operation has begun. Without this trapping operation, the dynamic behavior of the system tends to allow the roller to either undershoot or overshoot its selected position depending on what track was chosen.

The velocity control detent is mounted on the same shaft that mounts the velocity shift yoke assembly. A heavy spring holds it laterally to the right against the face of the tab cord anchor bracket. This is its normal operating position. The spring loading acts only as a spring relief for the velocity control detent. Its function is to dampen the amount and frequency of undershoot that occurs in the slider assembly without generating excessive forces on the detent teeth of the velocity control detent.

The radial operation of the velocity control detent is accomplished through a narrow steel cam mounted on the print sleeve on the right side of the print cam. This cam, which is called the velocity control detent cam, is keyed to the print sleeve by the print sleeve key. Whenever this cam rotates, it causes the velocity control detent to go through its trapping function. The velocity control detent is spring loaded against the cam by the same spring that loads the detent to the right. A small arm extending upward from the right-hand corner of the detent performs as a follower as it rides against the cam (Fig. 4-2). The timing relationship between the shifting of the roller and the trapping operation of the velocity control detent is such that the detent engages the tape connector before the tape connector reaches its selected position. In fact, the tape connector ratchets across the detent teeth as it slides toward the right. After the slider assembly has been trapped and settles down, the detent is disengaged and restored back to rest. This restoring action of the detent occurs well before print time.

The motion to shift the print cam follower roller comes from the velocity control cam which is set-screwed on the left-hand end of the filter shaft. A cam follower called the velocity control cam follower (Fig. 4-3) pivots on a stud mounted on the left-hand keyboard sideframe. The follower contains a small steel roller at the top which rides on the cam. Two links

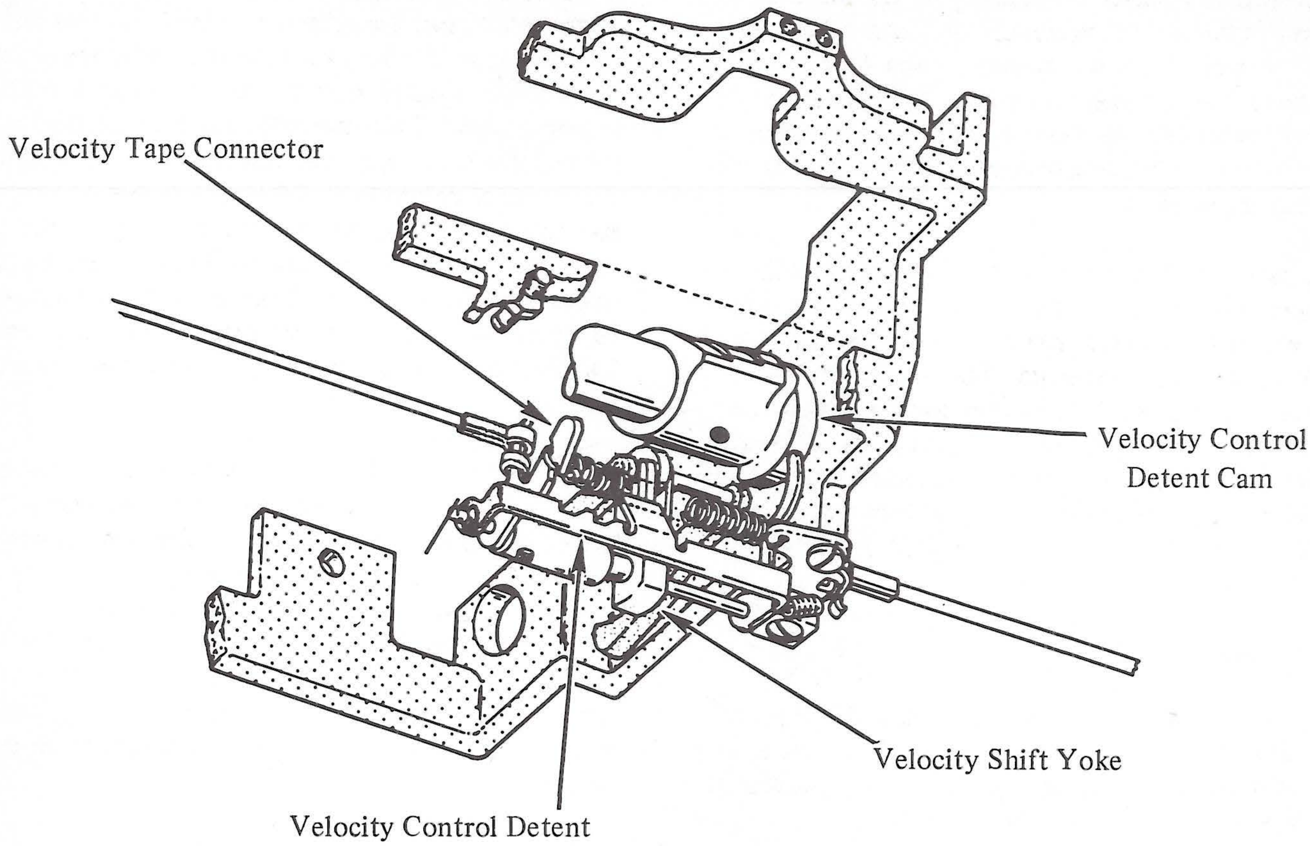


FIGURE 4-2

and a bellcrank serve to transmit the motion developed at the lower arm of the follower to the lower end of the velocity tape arm (Fig. 4-3).

When the filter shaft is at rest, the steel roller on the velocity control cam follower rests on the high dwell of one of the two lobes on the velocity control cam. With the follower in this position, the print cam follower roller is in its extreme left position. This places the roller slightly left of center of the high velocity print cam track. When a print cycle begins the velocity control cam rotates with the filter shaft. If the cam follower is allowed to follow the cam until it strikes the no-print eccentric stop, which is mounted on the keyboard sideframe, the top of the velocity tape arm will move in toward the sideframe causing the print cam follower roller to shift all the way across the print cam to the no-print track. This is the extreme right operational position for the roller. Therefore, since the motion produced by the velocity control cam is sufficient to shift the roller completely across the print cam, then all that is necessary to control how far the roller shifts is to control how far the velocity control cam follower follows the cam toward its low point. This is accomplished through the velocity control stops (Fig. 4-3).

The three velocity control stops, which are mounted on a pivot stud directly in front of the velocity control cam follower, provide a selective method of controlling the motion of the cam follower. The three stops are called from left to right: high, medium, and low velocity stops. Each stop mounts on the eccentric shouldered portion of a hexagon shaped bushing. Each bushing is secured to the mounting stud by a set screw. The set screw is located on the bottom flat of each bushing.

The clearance between the working end of each stop and the cam follower controls how much motion the cam follower will receive when that stop is selected to control the cam follower's motion. Each one of the stops is connected to its respective velocity code bail in the keyboard by a link and bellcrank (Fig. 4-3). The extension springs that load the stops into their rest position also bias the medium, low, and no-print bails into their rest position. Ultimately the rest position of the velocity control stops are determined by the following:

a. Low velocity stop by the extensions riveted on the front of the low velocity interposers.

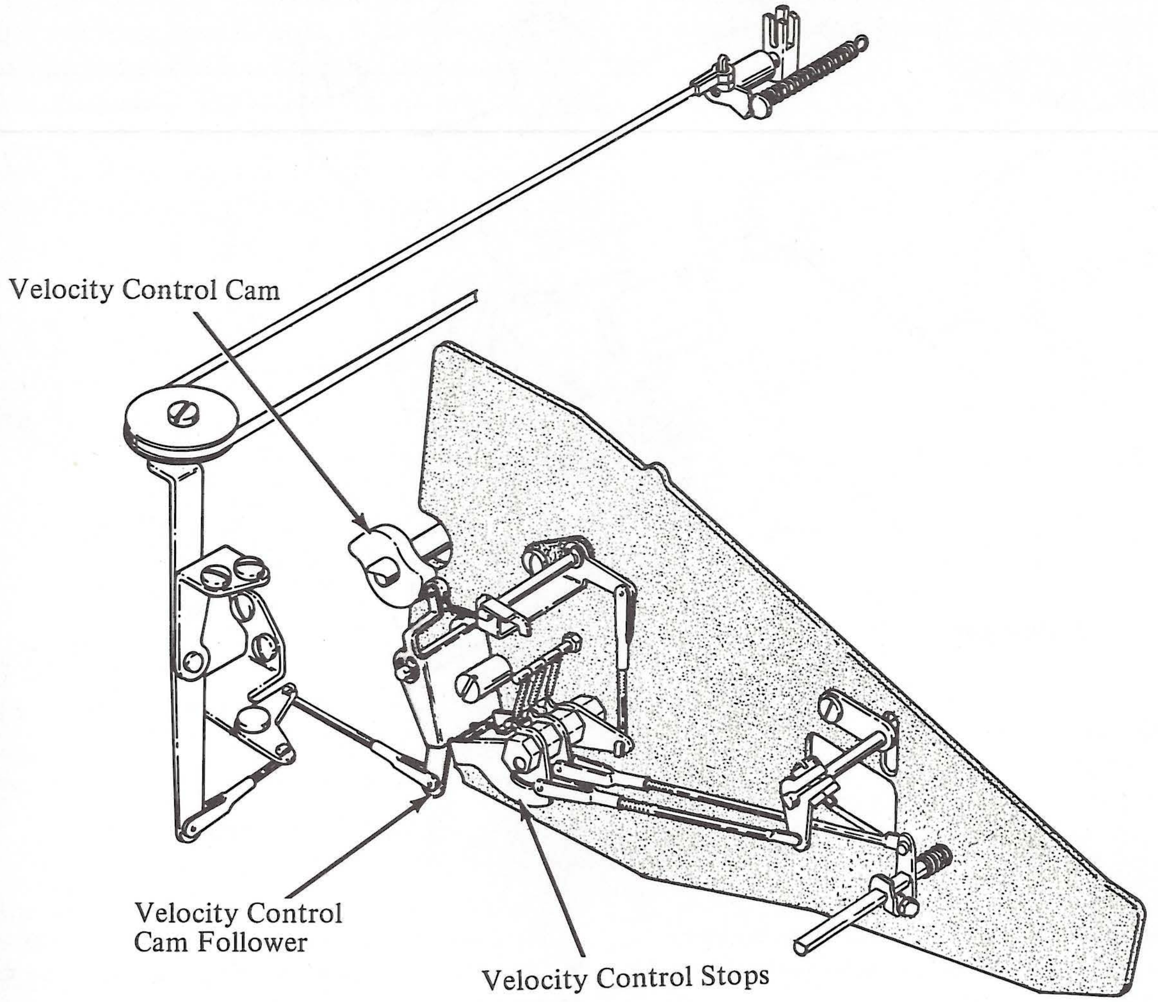


FIGURE 4-3

b. No print and medium velocity stops controlled by phenolic stops located on either side of the keyboard.

Selecting a high velocity character causes all of the velocity stops to remain in their rest position. In this high velocity print operation the high velocity stop, which is closest to the cam follower, stops the cam follower as shown in Figure 4-4A. The cam follower during this operation receives only the amount of motion allowed for the high velocity stop reset clearance (.001" to .004"). This small amount of motion allows the print cam follower roller to shift to the right slightly. In this position the roller is properly aligned with the high velocity track of the print cam.

Selection of a medium velocity character at the keyboard results in rotation of the medium velocity bail. This causes a pull to be produced on the link that is connected to the high velocity stop. The high velocity stop is rotated counterclockwise out of the path

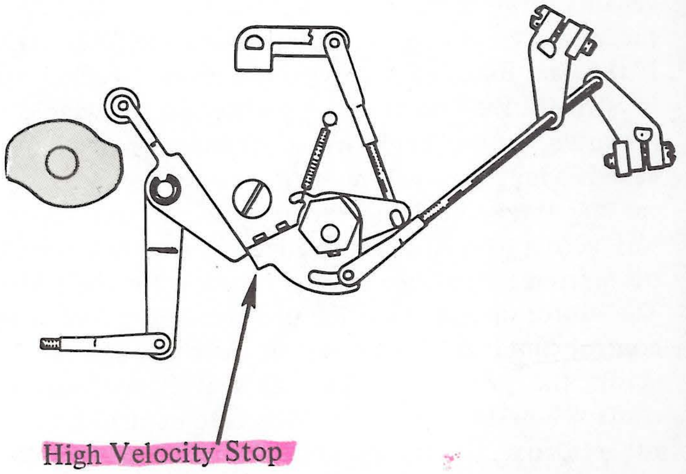


FIGURE 4-4A

of the cam follower. In this selection the cam follower's motion is controlled by the medium velocity stop (Fig. 4-4B). Thus, the print cam follower roller shifts to the right until it is aligned with the medium velocity track on the print cam.

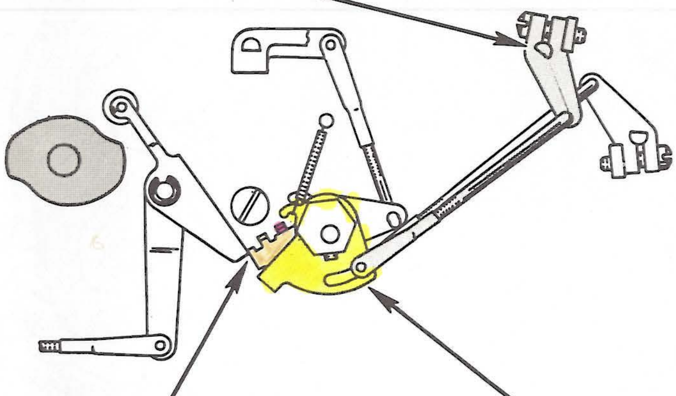


FIGURE 4-4B

Selection of a low velocity character causes the low velocity bail to rotate the medium velocity stop counterclockwise out of the path of the cam follower. A crossover lug on the top of the medium velocity stop causes the high velocity stop to be rotated out of the path of the cam follower also (Fig. 4-4C). The follower is then stopped by the low velocity stop which allows the roller to shift to the low velocity track on the print cam. When the high velocity stop is rotated out of the path of the cam follower by the crossover lug of the medium velocity stop, the elongated hole at the link connection of the high velocity stop prevents the motion of the high velocity stop from being fed back to the medium velocity bail.

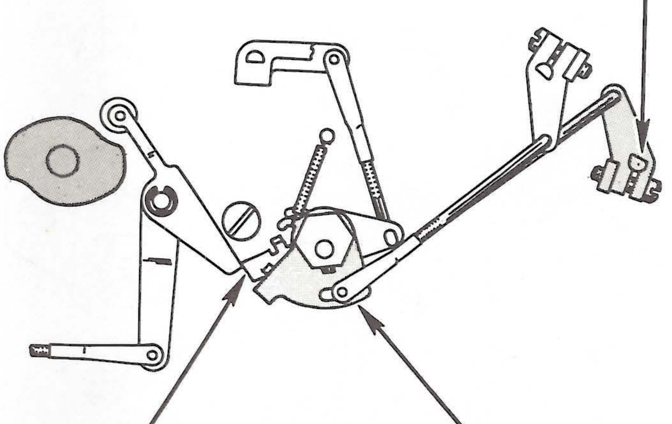


FIGURE 4-4C

Rotation of the no-print bail causes the low velocity stop to be rotated counterclockwise out of the path of the cam follower. A crossover lug on the top of the low velocity stop extends over the top of the medium velocity stop, thus during a no-print selection all of the stops are rotated out of the path of the cam follower. The cam follower then follows the cam until it strikes the no-print eccentric stop (Fig. 4-4D), and the print cam follower roller is shifted to the no-print track on the print cam.

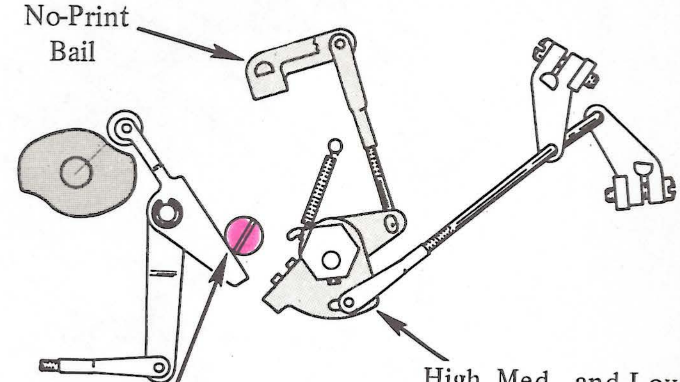


FIGURE 4-4D

During either a medium, low, or no-print operation, the keyboard interposer must drive the selected velocity stop out of the path of the velocity cam follower before the follower starts down the cam or the high velocity stop will be trapped by the follower. This would cause an excessive load to be placed on the velocity bail as the interposer is being driven forward by the filter shaft. Not only could the wrong velocity selection occur, but also damage to the mechanism could result. In addition to the selected velocity stops being rotated out of the path of the cam follower before the cam follower begins to move down the cam, they must also remain out of the path of the follower until the follower has passed their position. Otherwise, one of these stops might restore back into the path of the follower resulting in an erroneous velocity selection. A retarded velocity cam is the greatest contributor to this condition.

To obtain the correct velocity selection for upper case characters, the medium velocity bail has been made shift sensitive. When the typing element is shifted into upper case, the medium velocity bail, in the keyboard, is shifted to the left. This causes a different set of coded tabs, located along the bottom of the bail, to move into alignment with the selector lugs on the character interposer. This upper case set of coded tabs makes it possible for a medium velocity

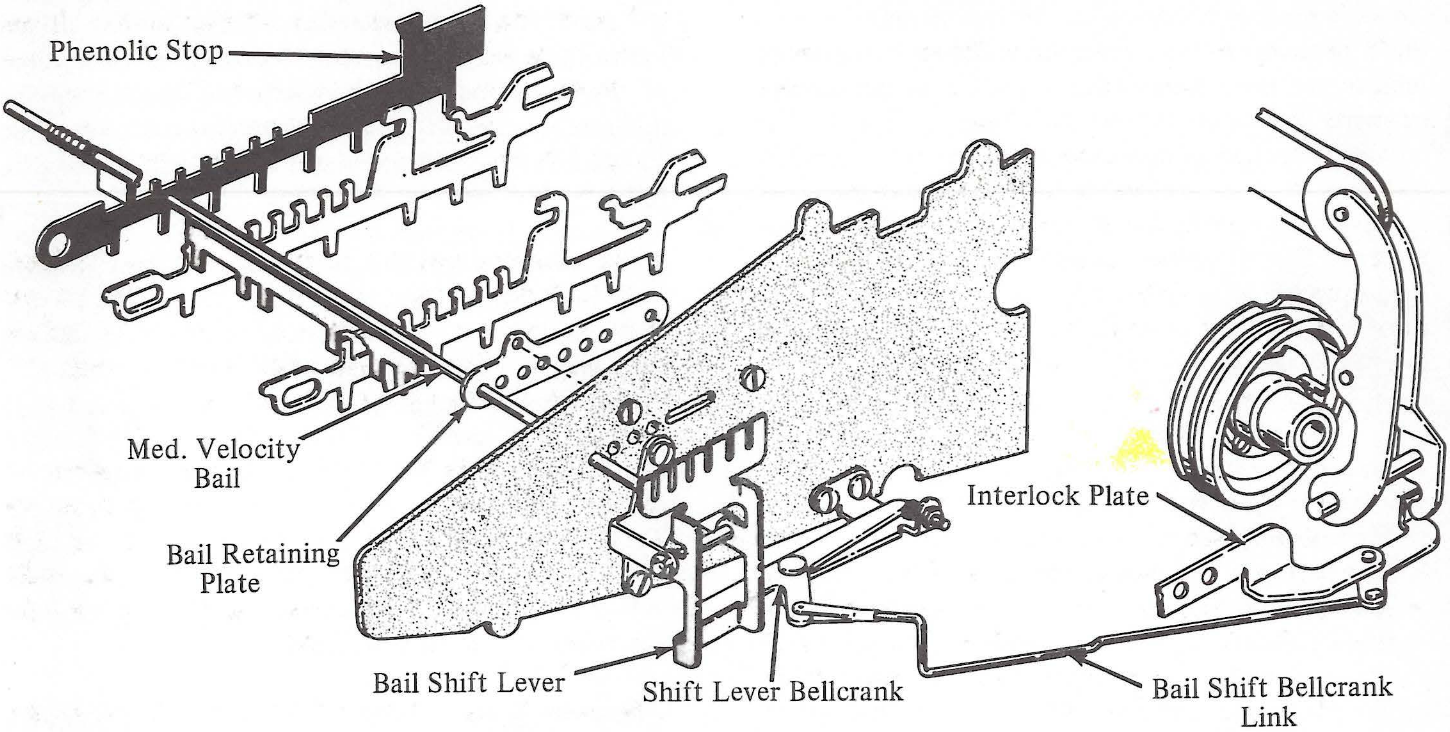


FIGURE 4-5

lower case character to become a high velocity character in upper case or vice versa. The medium velocity bail has a compression spring at its left end which loads the bail toward the right into its lower case position. Whenever the shift button is depressed a lever called the bail shift lever, mounted on the right-hand keyboard sideframe and operated by the shift arm, shifts the medium velocity bail to the left into its upper case position (Fig. 4-5). Because of no change in velocity requirements between upper and lower case low velocity characters, the low velocity bail is not shift sensitive.

2. Impression Control

Other than for the rocker upstop, the impression control mechanism is the same as in the standard machine (Fig. 4-6).

The purpose of the upstop, which is made of spring steel, is to limit the motion of the rocker when the platen is removed. The limiting action comes from the stud on the bottom of the impression control lever striking the upstop near the end of "free flight". This prevents parts damage or breakage to the cardholder or the font.

The upstop mounts on a screw on the inner face of the carrier directly above the mounting stud of the print cam follower. A binding nut secures the upstop to this screw. An adjusting screw threaded vertically down through the top of the carrier casting contacts a lug on the upstop that projects into a hole in the side of the carrier. This screw is used to control the vertical position of the upstop. It determines when the stud on the bottom of the impression control lever contacts the upstop during "free flight".

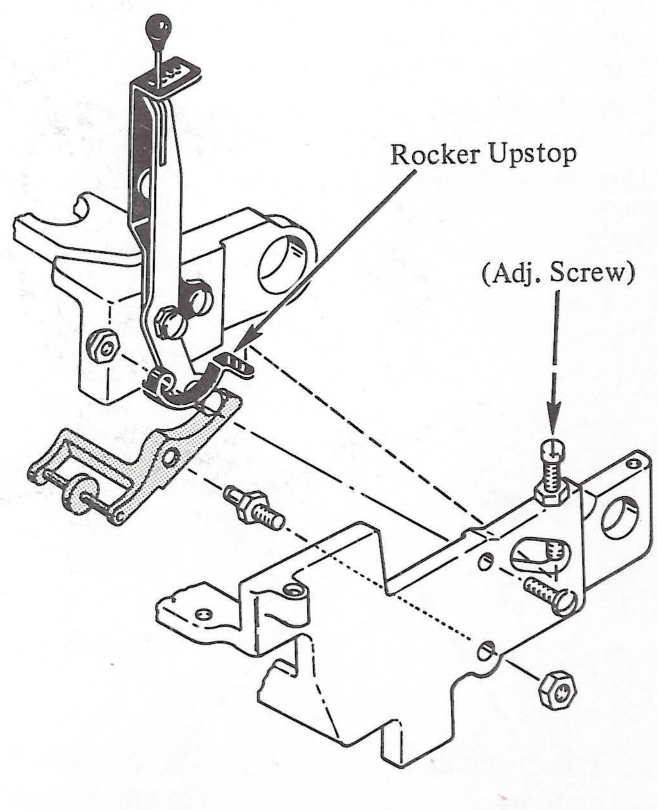


FIGURE 4-6

3. No-Print Control

Shifting the print cam follower roller to the no-print lobe of the print cam during a print cycle produces a no-print action to the typing element. That is, the motion that the typing element receives is not enough to cause the typing element to reach the paper. This is how escapement for a spacebar operation is attained. Each time the operator depresses the spacebar, the print cam follower roller is shifted to the no-print track on the print cam and then the machine is operated through a normal print cycle. How this is accomplished is explained in the spacebar section.

Although no-print is mostly used by the spacebar mechanism there is a no-print keybutton on the keyboard which allows the operator to place the machine in a continuous no-print mode. This button, located in the upper left-hand corner of the keyboard, when depressed, causes the print cam follower roller to shift, at the beginning of each cycle, to the no-print track on the print cam. The no-print keylever is designed so that it may be latched down by simply pushing the keybutton toward the rear after it has been depressed. As long as the button is either held or latched down the machine will remain in a no-print mode. No-print has no effect on the escapement selection system. Even though a character does not print when a keylever is depressed, the carrier receives the proper amount of escapement for that character.

The operator uses this feature mainly for "centering". With this feature, it is not necessary for an operator to type out and pre-measure her titles before beginning to type her final copy. Instead, when she reaches that point on her copy where a title must be centered, she merely depresses the no-print button and types the title out. She then reads the position of the carrier by the location of the carrier pointer on the front scale. With this reading applied to the centering scale; she then returns the carrier to the indicated position and, upon unlatching the no-print button, types out the title centered.

Depressing the no-print button merely over-rides the no-print bail in the keyboard. As the button is de-

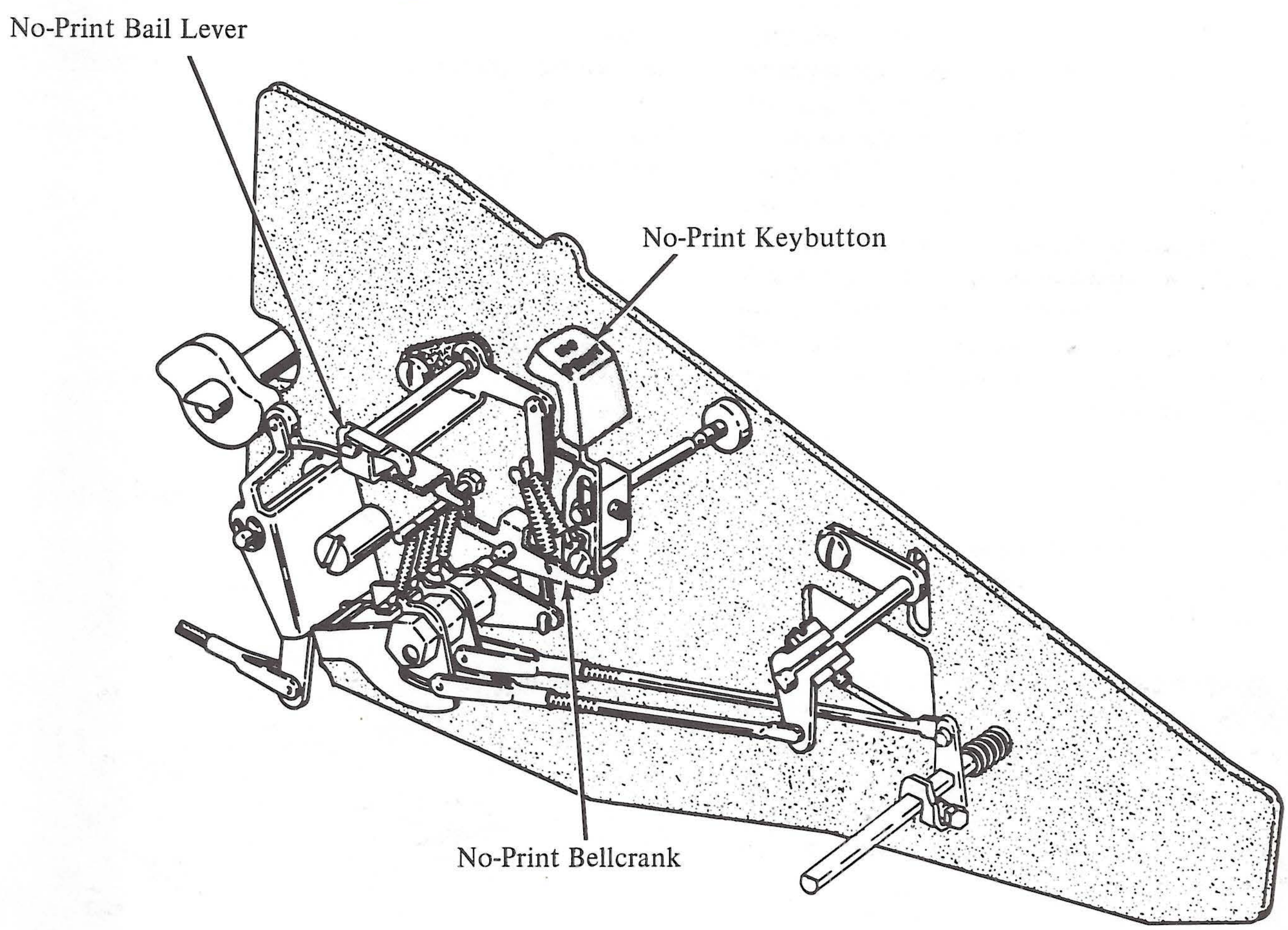


FIGURE 4-7

pressed, it causes the no-print bellcrank to rotate clockwise which in turn causes the no-print bail lever to rotate counterclockwise (Fig. 4-7). From this point on, the operation is the same as if the no-print bail were rotated by the spacebar interposer in the keyboard. That is, all of the velocity stops are rotated out of the path of the velocity control cam follower so that the follower will travel to the no-print eccentric stop. When the follower reaches the eccentric stop, the roller is aligned with the no-print track on the print cam.

Although the no-print lobe on the print cam is designed with a slight amount of rise which produces motion to the rocker during a no-print cycle, the motion is not sufficient to cause the typing element to strike the platen. The rise on the no-print lobe is there only to overcome a design interference between the high point of the print cam and the print cam follower.

Figure 4-8 illustrates the latch down feature of the no-print keylever. A screw located on the lower portion of the no-print detent serves as a latching surface for the no-print keylever when the button is depressed and then pushed toward the rear. Notice that the keybutton must be depressed first before it is pulled forward for release. This assures that the no-print button cannot be accidentally released during a no-print operation.

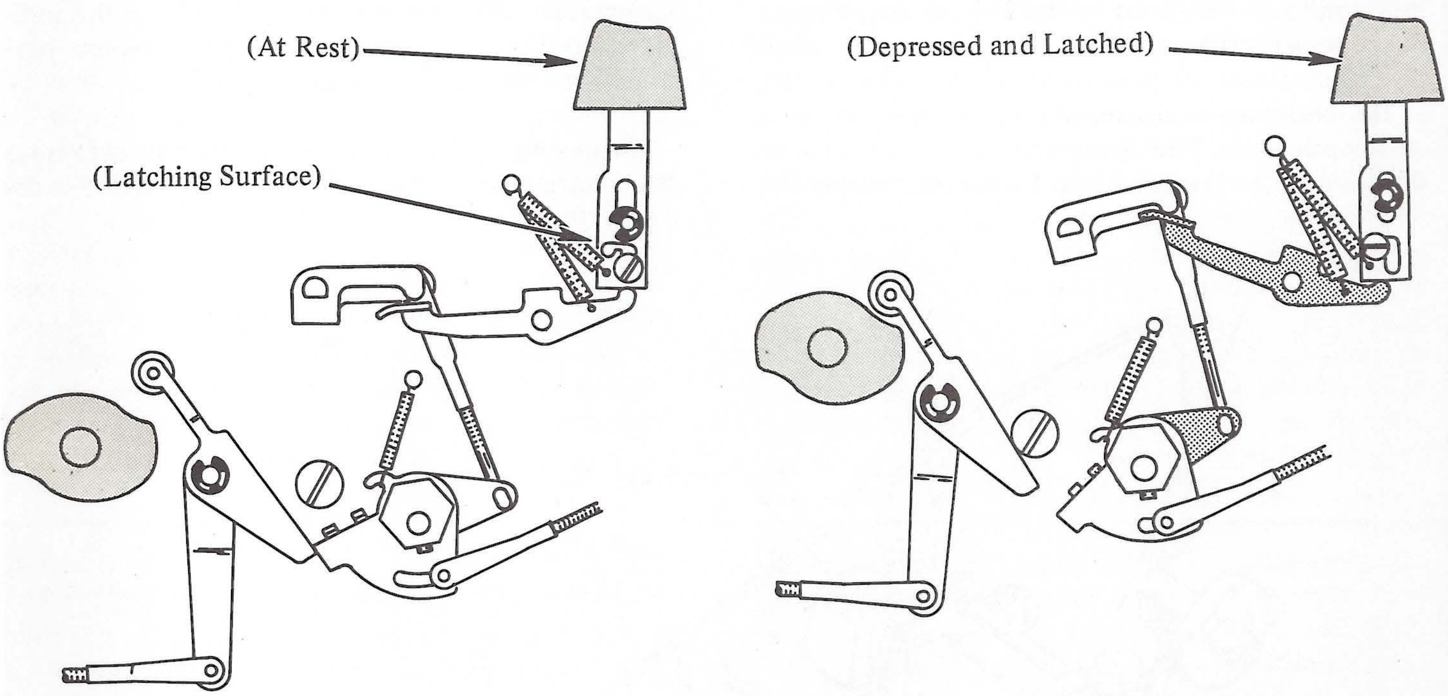


FIGURE 4-8

Form No. 241-5345-1
Printed July, 1968

ESCAPEMENT

The escapement mechanism in the "Selectric" Composer is totally different from that of the base machine. On the "Selectric" Composer, escapement is achieved through a leadscrew and follower arrangement. Whenever an escapement operation is called for, the leadscrew is rotated causing the carrier which contains the leadscrew follower, to escape to the right the desired amount. By controlling the amount of leadscrew rotation for any character selection, the amount of carrier movement can be adjusted to fit the width of the printed character. Leadscrew rotation for each escapement operation is controlled by a pinwheel and pawl arrangement. A pinwheel which contains sixty holding pins is geared to the leadscrew. By using the sixty holding pins of the pinwheel as a control over the leadscrew rotation, a unit system is developed which makes proportional spacing possible.

The leadscrew and pinwheel assembly, which is spring biased in the escapement direction, is held from rotating by a pawl that is seated against one of the holding pins of the pinwheel. As soon as a character is selected at the keyboard, the amount of escapement required for that specific character is gained by first selecting which pin in the pinwheel will be next to hold and then releasing the escapement pawl to allow the pinwheel to advance to that selected pin. The unit system is derived directly from the pins in the pinwheel. The amount of escape movement produced at the carrier by allowing the pinwheel to advance one pin is one unit. The unit escapement values of all the characters in the keyboard range from three to nine units. Three units equaling three pins of rotation of the pinwheel and nine units equaling nine pins of rotation of the pinwheel.

This entire escapement mechanism, for instruction purposes, can be divided into two major areas. Escapement control, which covers all of the mechanical actions that take place from the releasing of the escapement pawl to the escape movement of the carrier. The other area is the escapement selection mechanism. Here, we will only be concerned with the process of selecting the correct amount of escapement for any given character.

Other integral areas within the escapement mechanism such as leadscrew bias, rebound governor, and pitch changer, for the purpose of simplicity, will each be explained separately later in this section.

1. Escapement Control

The escapement motion of the carrier is controlled by the leadscrew. This leadscrew, which is hollow to reduce its inertia, is a long spiral threaded shaft that extends across the width of the machine directly behind the rear carrier support rack. The leadscrew is supported at each end by ball bearings. The ball bearing at the left end fits snugly into a hole in the machine powerframe. A support plate and retainer, fastened to the powerframe by two screws, secures the bearing in place (Fig. 5-1). A shoulder on the outer race of the bearing is trapped between the support plate and the retainer. This prevents the bearing from moving laterally.

The ball bearing that supports the right hand end of the leadscrew fits in a hole in the tab rack plate. The outer race of this bearing is shouldered on the left side. This shoulder and the right hand leadscrew gear limit

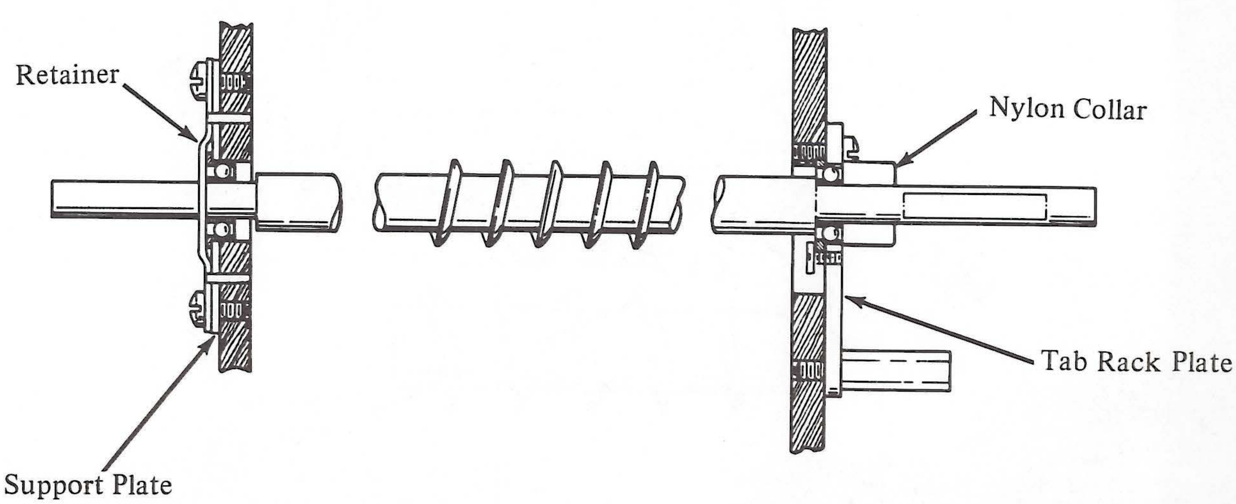


FIGURE 5-1

the end play of the leadscrew. The nylon collar merely acts as a spacer to allow alignment of the gears. The diameter of the leadscrew is reduced where it passes through the bearing.

The coupling between the leadscrew and the carrier is through a shoe. This shoe, called the leadscrew shoe, is mounted to an arm which is fastened to the escapement bracket as shown in Figure 5-2. The shoe is mounted to the shoe arm by a shouldered rivet. A light extension spring loads the shoe counterclockwise (viewed from the rear of the machine) into its rest position. The stud that mounts the shoe arm to the escapement bracket is eccentric. This is for adjustment purposes. Looking from the rear of the machine, the shoe arm is spring loaded counterclockwise by an extension spring at its left end. The shoe arm rocks counterclockwise until the shoe bottoms in the leadscrew.

The normal force between the leadscrew and the shoe is as parallel as possible to the axis of the leadscrew in order to keep the dynamic bending and rebounding of the leadscrew to a minimum. The shoe and shoe arm are mounted to the bracket with a minimum amount of looseness to maintain a fixed lateral position with respect to the leadscrew to keep the carrier motion proportional to leadscrew rotation.

Contact between the working surface of the shoe and the leadscrew is maintained by the carrier mainspring tension; the same as it would be if an escapement pawl and rack were used. The reason for the shoe's configuration and its mounting is that during a carrier return operation the shoe must be able to rotate and then slide along the top of the leadscrew, over the threads, without restricting the carrier's motion and with a minimum of noise. The shoe is not disengaged from the leadscrew during a carrier return operation. This shoe to leadscrew relationship also permits the operator to manually push the carrier to the left without damaging the leadscrew or shoe.

The force to rotate the leadscrew during an escapement operation comes from a spring bias mechanism located at the left end of the leadscrew. For the time being without going into an explanation let's assume that the leadscrew bias mechanism provides a relatively constant rotational torque to the leadscrew in

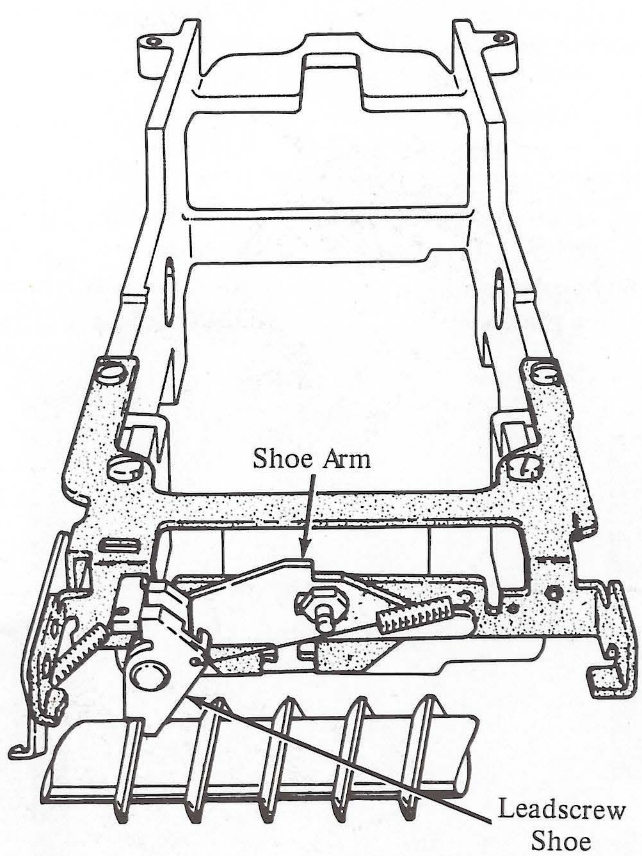


FIGURE 5-2

the escapement direction. This torque being applied to the left end of the leadscrew is strong enough to rotate the leadscrew, gear train, and pinwheel assembly whenever the escapement pawl is disengaged from the pinwheel. A complete explanation of how the bias mechanism develops the torque can be found in the latter part of this section.

With a constant torque applied to the left end of the leadscrew all that's necessary to learn now is how the escapement pawl and pinwheel assembly are used to control the rotation of the leadscrew. The simplified drawing (Fig. 5-3) illustrates how the leadscrew is geared to the pinwheel. The gear at the right hand end of the leadscrew drives the idler gear which in turn drives the intermediate gear and the gear changer shaft. The change gear, keyed to the left end of the shaft, then carries the motion to the transfer gear which is fastened to the pinwheel hub. Therefore, the torque on the leadscrew is felt all the way through the system to the pinwheel. With the machine at rest, it is ultimately the escapement pawl against a holding pin in the pinwheel that is opposing the torque of the leadscrew. Because this torque is always present and is in the escapement direction, all of the backlash in the gear train is biased out. Whatever motion the pinwheel receives, the leadscrew receives a corresponding amount. The amount of backlash in the system has no effect on the amount of forward motion that the leadscrew receives. It does, however, affect the amount of dynamic rebounding of the leadscrew during an escapement operation.

The amount of pinwheel rotation is controlled by the escapement pawl and the setting of the holding pins in the pinwheel. Observing Figure 5-3, you can see that the escapement pawl will only engage those holding pins that extend out the left hand face of the pinwheel. From Figure 5-3 you can see that if the escapement pawl were tripped the pinwheel would advance four pins before it is stopped by the escapement pawl. Since the distance from one pin to the next produces one unit of escape motion to the carrier, then in this operation the carrier would receive four units of motion. Therefore, the desired units of escapement for any character is gained by merely setting the correct holding pin in the pinwheel and then tripping the escapement pawl to allow the pinwheel to advance to the set pin. How these pins are selected and set will be explained in the escapement selection section. At

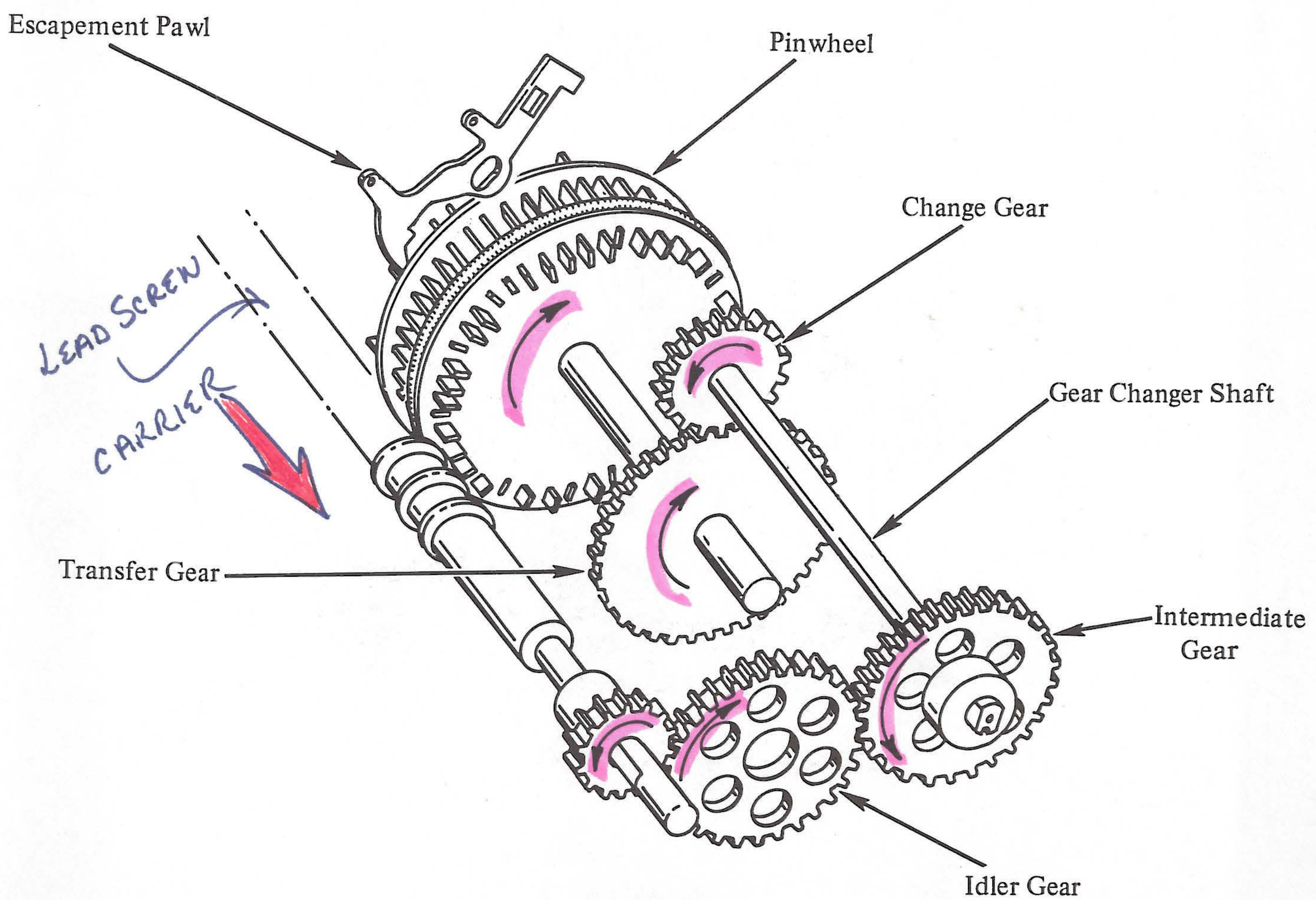


FIGURE 5-3

this point let's go back to the right hand end of the leadscrew and go through the gear train in more detail.

The right hand leadscrew gear is set screwed by two bristo screws. Both of these screws tighten onto a flat spot on the leadscrew. The idler gear, which is driven by this leadscrew gear, mounts on a plate that is fastened to the powerframe by three spacer type studs (Fig. 5-4). The idler gear, which has a ball bearing pressed into its center, mounts on the shoulder of a stud that is secured to the plate by a backup adjusting plate. The hole in the plate, that accepts this stud, is oversized and elongated so that the idler gear may be adjusted to control its backlash with both the leadscrew and the intermediate gear.

The intermediate gear is keyed to the gear changer shaft. Two bristo screws secure this gear to the shaft. One bristo screw tightens down against the key while the other tightens against a flat spot of the shaft. A ball bearing pressed into the idler gear mounting plate serves as a bearing for the gear changer shaft. End play of the shaft towards the right is limited by an aluminum collar which is set screwed to the shaft on the inside of the idler gear mounting plate. The set screw securing this collar tightens against a flat spot on the gear changer shaft. This flat spot protects the round portion of the shaft from being scored by the set screw. For safety reasons a gear guard has been provided for the intermediate and idler gears. This guard is mounted by the same stud that supports the rear of the idler gear mounting plate.

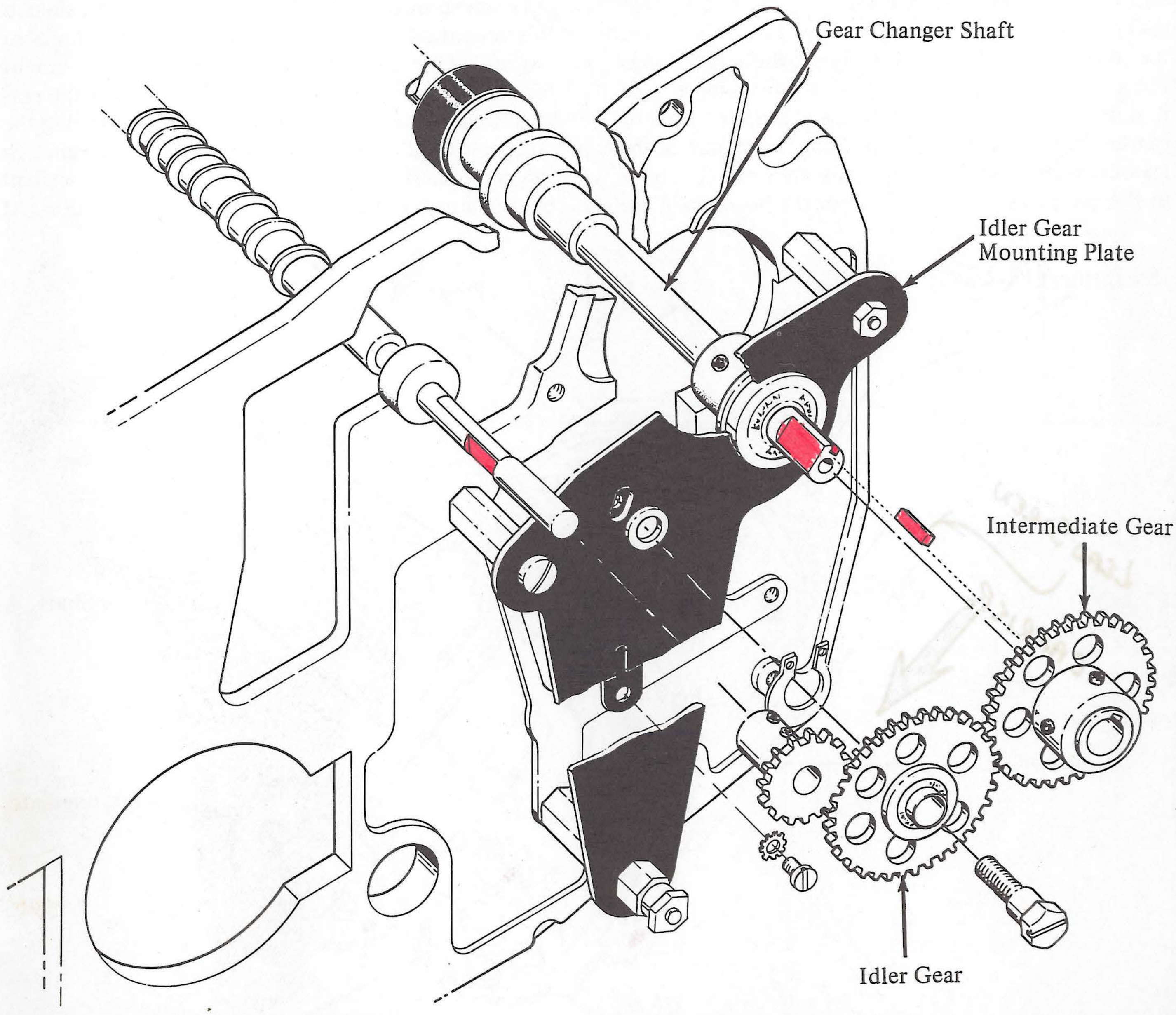


FIGURE 5-4

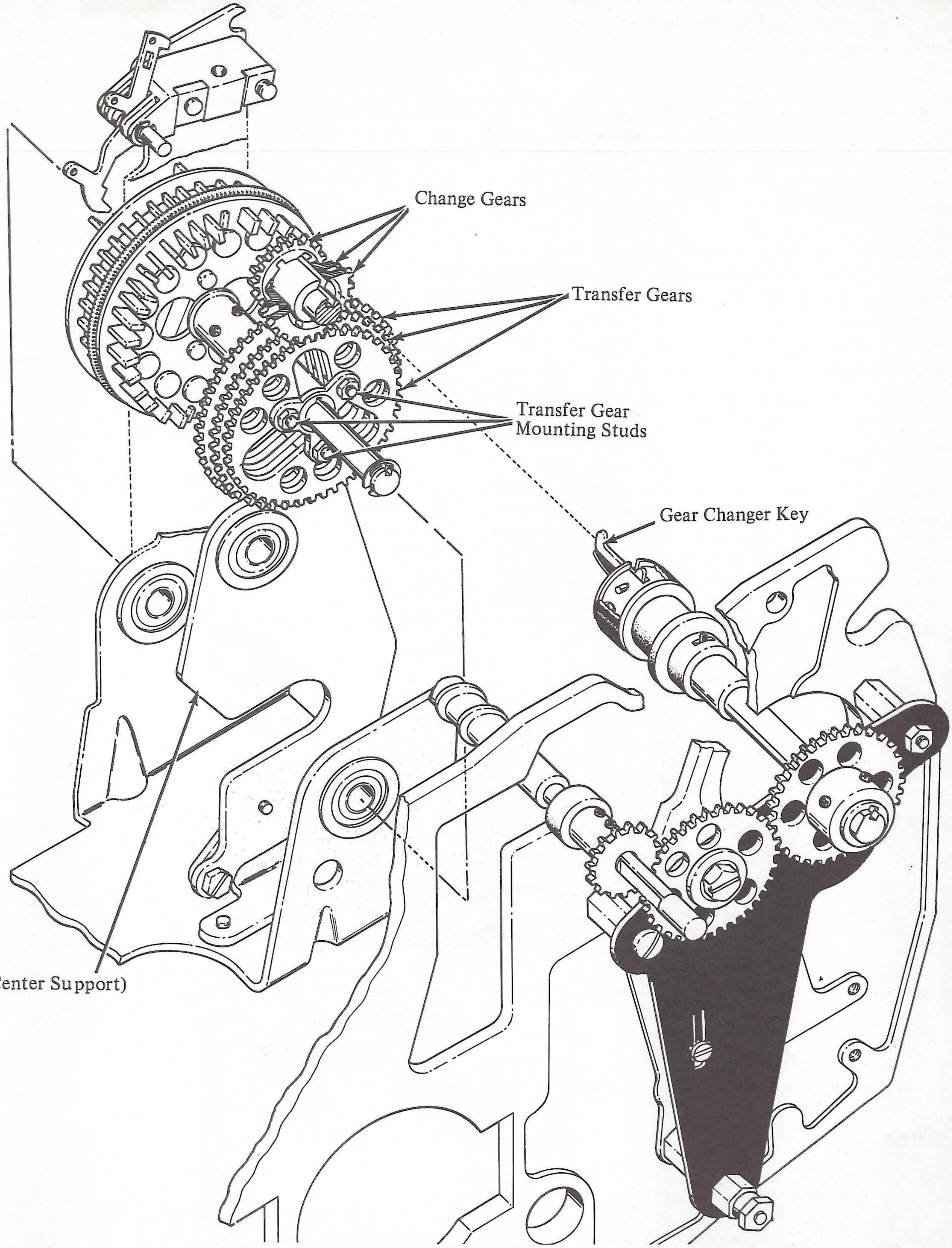

Change Gears
Transfer Gears
Transfer Gear
Mounting Studs
Gear Changer Key
(Center Support)

FIGURE 5-5

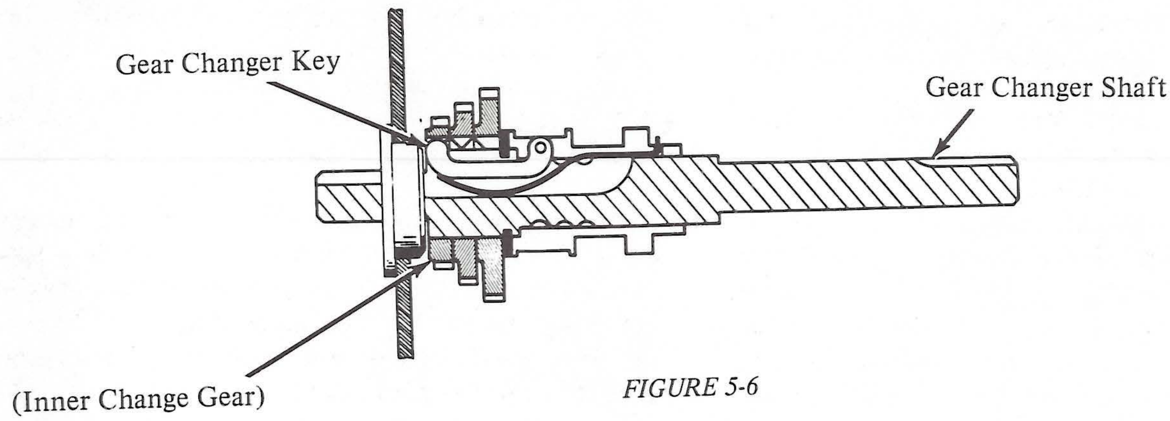


FIGURE 5-6

The gear changer shaft is supported at the left by a ball bearing which is press fitted into the center support of the pinwheel mounting bracket (Fig. 5-5). The end play towards the left for this shaft is limited by the shoulder of the shaft riding against the face of the inner race of the ball bearing. The main function of the gear changer shaft is to support the gear changer mechanism. At this point, for simplicity reasons, we will try to avoid getting into any detail on this changer mechanism. It will be treated as a separate mechanism later on in this section. In Figure 5-6 you can see that there are three individual change gears mounted on the left end of the changer shaft. A large C-clip controls the lateral position of the gears toward the right; towards the left they are limited by the face of the outer race of the ball bearing.

The inner gear is keyed to the gear changer shaft. The other two change gears are disconnected and riding free. This relationship is illustrated by the cross-sectional view shown in Figure 5-6. With the gear changer key positioned as shown, the driving action from the gear changer shaft to the lower cluster of transfer gears is being accomplished through the inner change gear. The driving action can easily be gained through either one of the other two

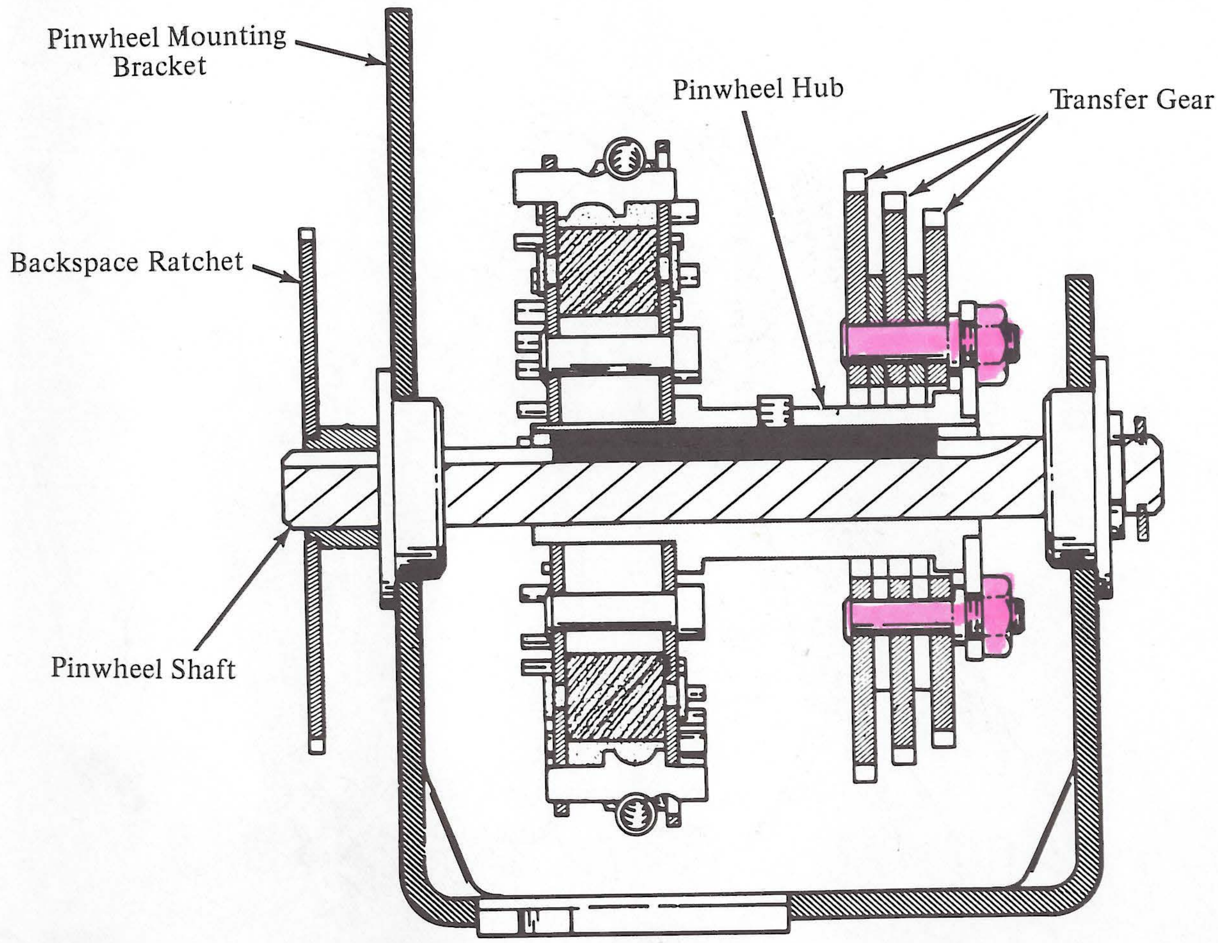


FIGURE 5-7

change gears by merely shifting the gear changer key into mesh with one of the keyways located in either of the other two change gears. As you will see later, this is how a gear change operation is accomplished.

The three transfer gears, which are all tied together, are driven in unison by whichever change gear has been selected to drive. The function of the transfer gears is to transmit this motion to the pinwheel assembly. The three transfer gears are fastened together by three studs. The right hand end of these three studs, which are threaded, are used to mount this assembly to a three holed flange located on the right hand end of the pinwheel hub. The three holes in the flange that accept these three studs are elongated so that the transfer gear assembly can be adjusted rotationally with respect to the pinwheel. Three binding nuts secure the assembly in position (Fig. 5-5).

The pinwheel assembly is pinned and riveted to the pinwheel hub. The transfer gear mounting flange is ring welded onto the right end of the pinwheel hub. This entire assembly then mounts onto the pinwheel shaft. Two bristo screws and a key secure the assembly to the shaft. The bristo screws are located in the pinwheel hub just to the right of the pinwheel. One bristo screw tightens against the key. The other bristo screw tightens against a flat spot on the pinwheel shaft. Both ends of the pinwheel shaft are mounted in ball bearings which have been press fitted into the pinwheel mounting bracket. The end play of this shaft is controlled by a C-clip at the right hand end and the hub of the backspace ratchet at the left hand end. Figure 5-7 shows a cross-sectional view of the pinwheel assembly as it appears when mounted in its bracket.

The escapement pawl, which controls the escapement operation of the pinwheel, mounts in a pawl block that is fastened to the left side of the pinwheel mounting bracket by two studs (Fig. 5-8). This escapement pawl block not only mounts the escapement pawl but also the backspace holding pawl, the escapement trip lever, and the pawl release lever. All of these parts mount in the guide slots cut into the front of the pawl block. They pivot on the escapement pawl mounting pin which is held in place by a C-clip at each end.

To keep this area as simple as possible, let's talk about each item individually and then tie their operations together as we go. Beginning with the escapement pawl, from Figure 5-8 you can see that the mounting hole for the pawl is elongated. Also, that the

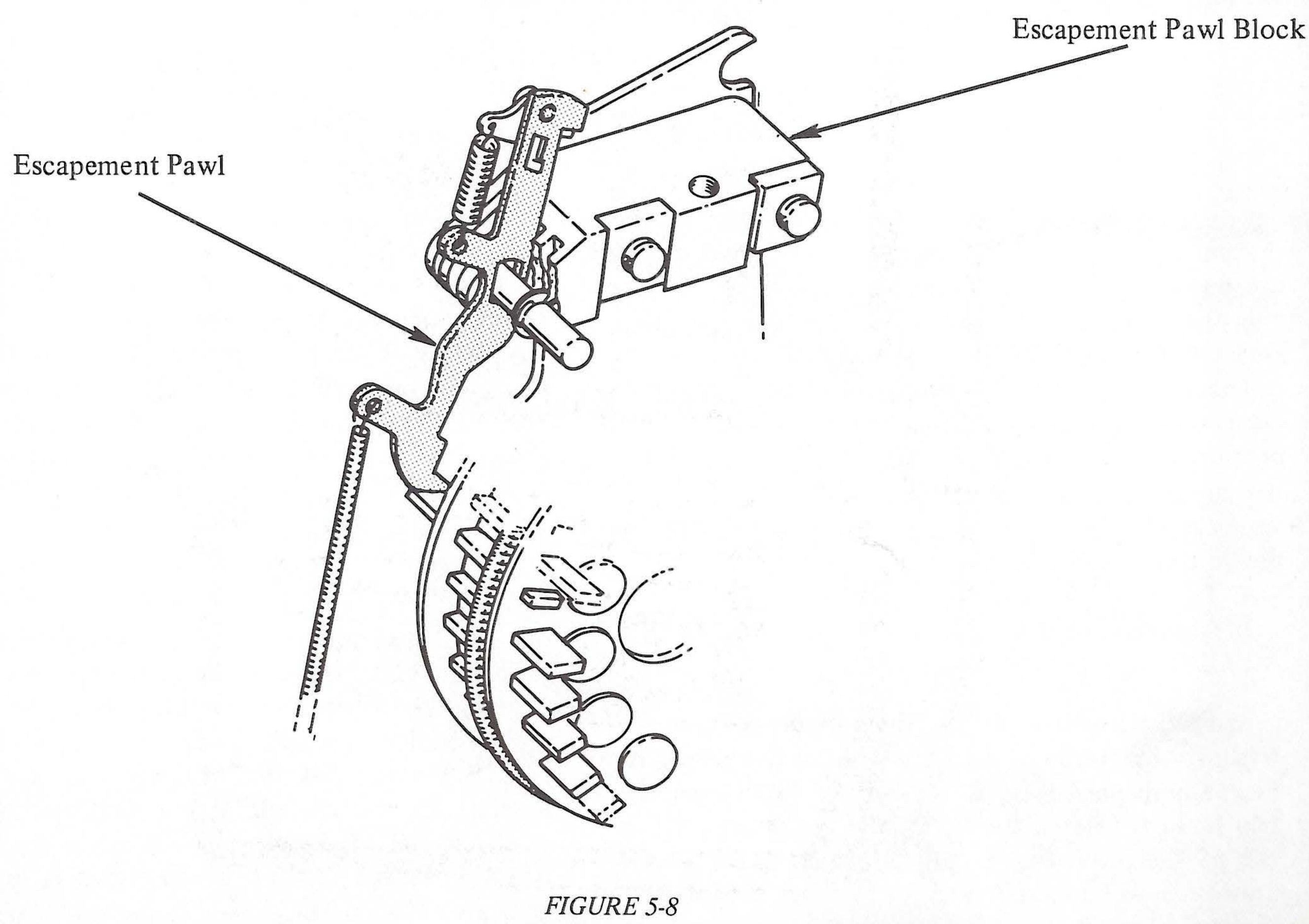


FIGURE 5-8

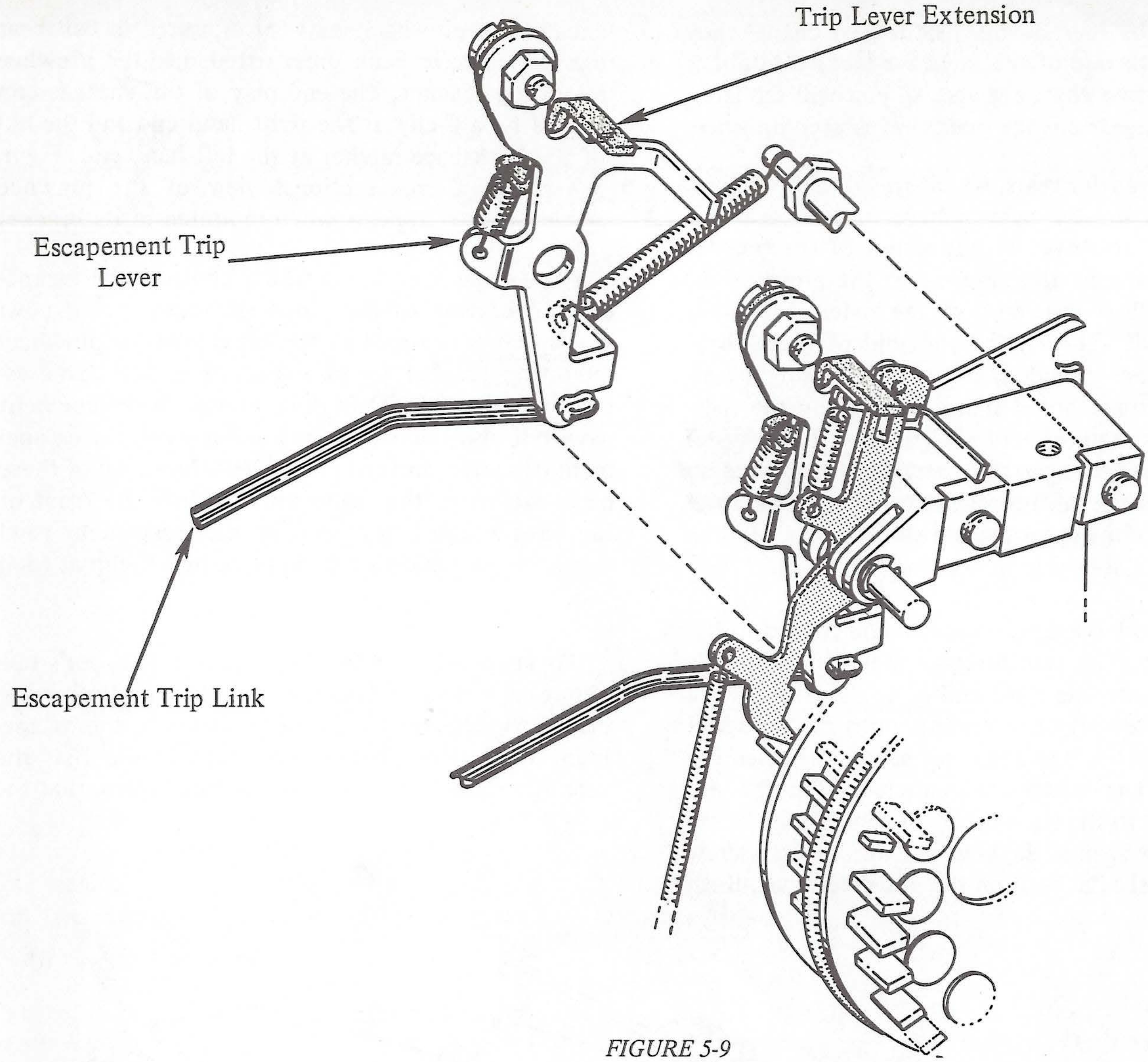


FIGURE 5-9

pawl spring is pulling down and counterclockwise on the pawl. The counterclockwise force is what holds the pawl engaged in the pinwheel. When an escapement operation is called for, a pull is produced on the escapement trip link (Fig. 5-9). This causes the escapement trip lever to rotate clockwise about the escapement pawl mounting pin. Mounted on the upper portion of this trip lever, by an eccentric stud, is the trip lever extension. The trip lever extension, which is spring loaded in the top to the rear direction against a lug on the trip lever, serves two purposes:

a. Trips out the escapement pawl.
b. Acts as an intermediate lever between the trip lever and the escapement pawl.

With the trip lever at rest, the horizontal lug of the trip lever extension rests just in front of the tail of the escapement pawl (Fig. 5-10A). When the escapement trip lever is rotated the horizontal lug pushes on the tail of the pawl (Fig. 5-10B) disengaging it from the pinwheel. As soon as the tip of the escapement pawl clears the holding pin the escapement pawl snaps forward on its elongated mounting hole (Fig. 5-10C). This causes the tail of the pawl to move out from beneath the horizontal lug of the trip lever extension. The escapement pawl is now free to restore back into the path of the pins in the pinwheel, even though the trip lever and extension may still be in their actuated position. As the pinwheel advances the next set holding pin picks up the escapement pawl and drives it back on its elongated mounting hole to its holding position (Fig. 5-10D). If the escapement trip lever has not restored far enough for the horizontal lug of the trip lever extension to clear the tail of the escapement pawl as it is driven back, then the tail of the pawl will be driven into the trip lever extension. This interference merely causes the trip lever extension to be rotated counterclockwise against its spring loading (Fig. 5-10D). As soon as the trip lever has restored far enough for the horizontal lug on the extension to clear the tail of the escapement pawl, the extension will snap back to its rest position ready for the next operation (Fig. 5-10E).

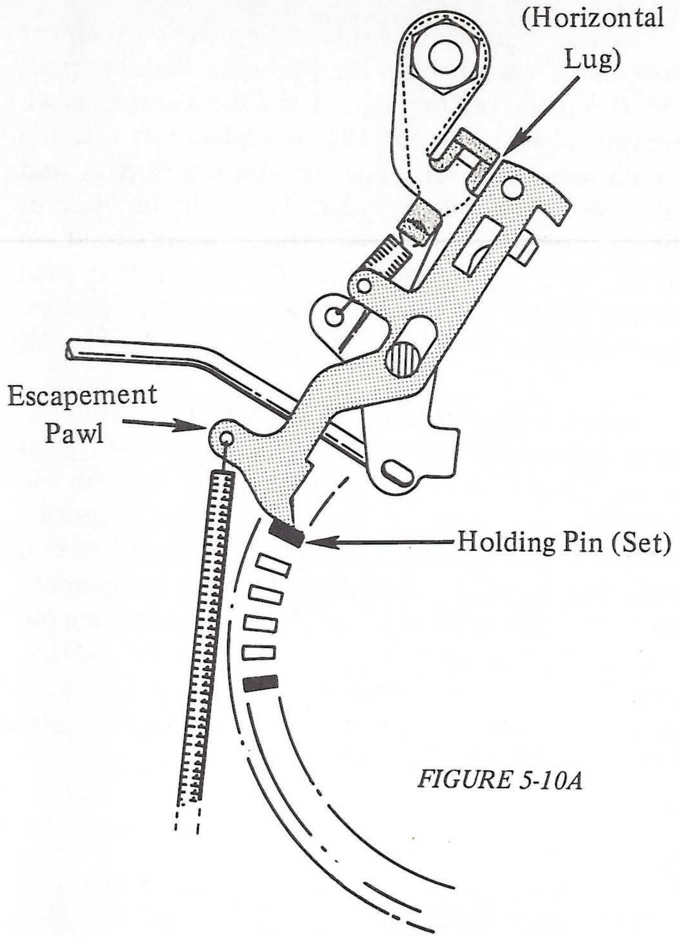


FIGURE 5-10A

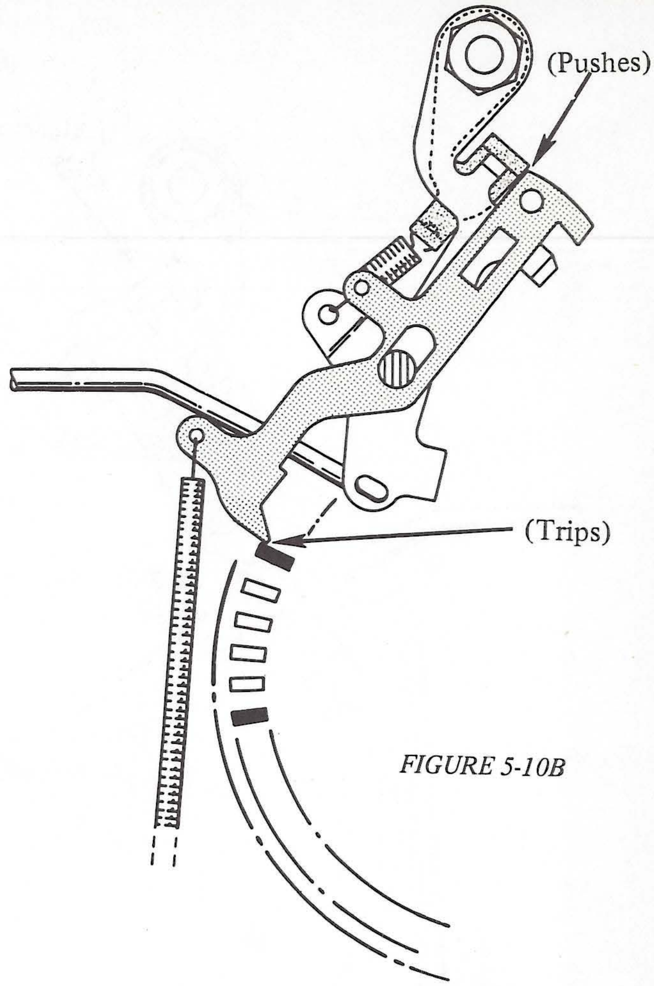


FIGURE 5-10B

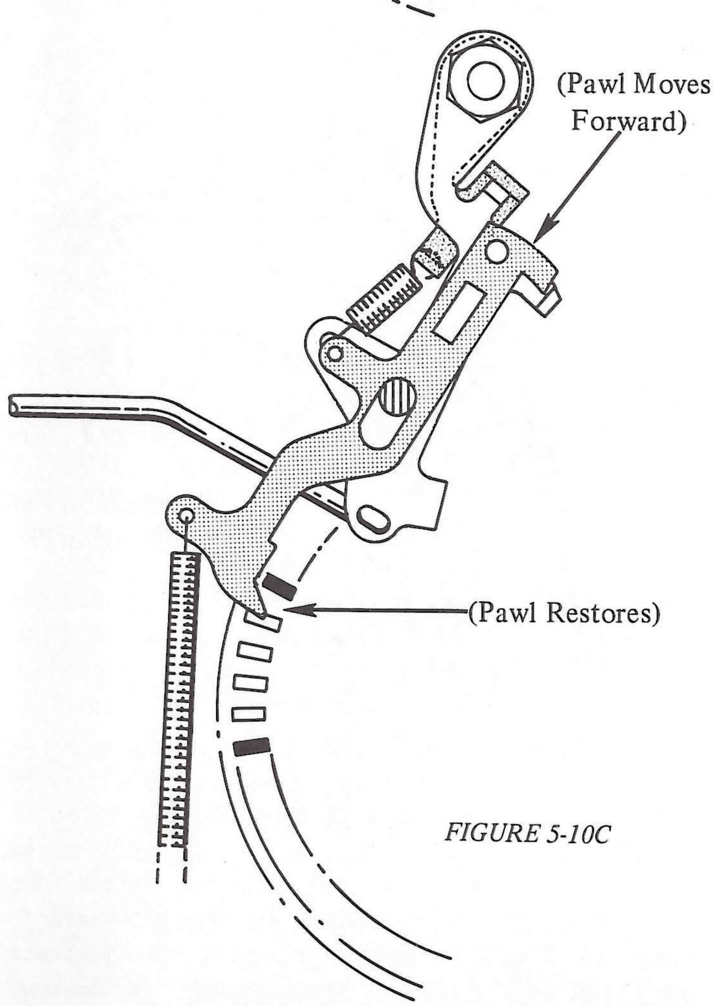


FIGURE 5-10C

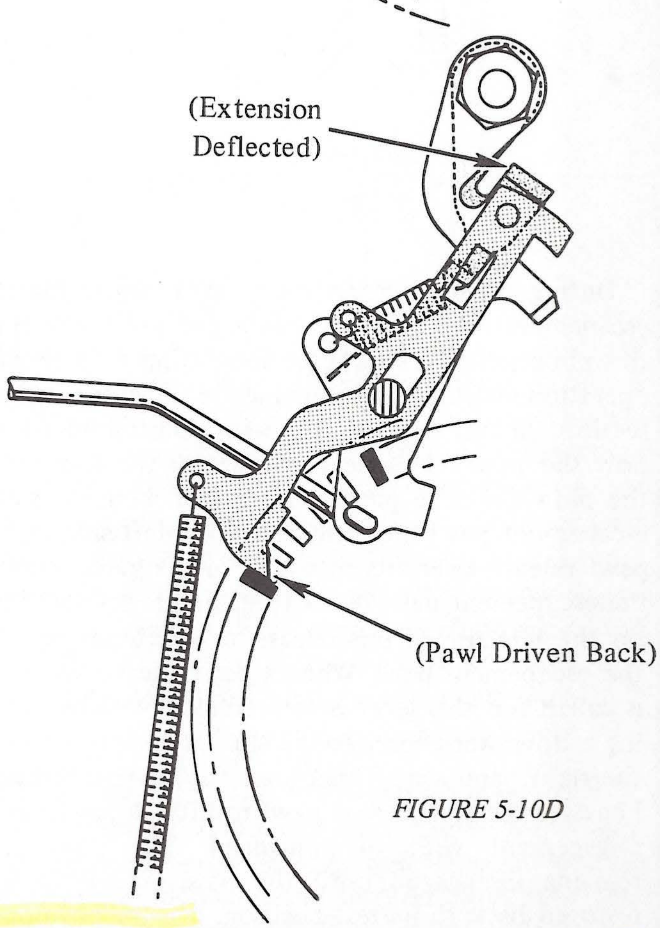


FIGURE 5-10D

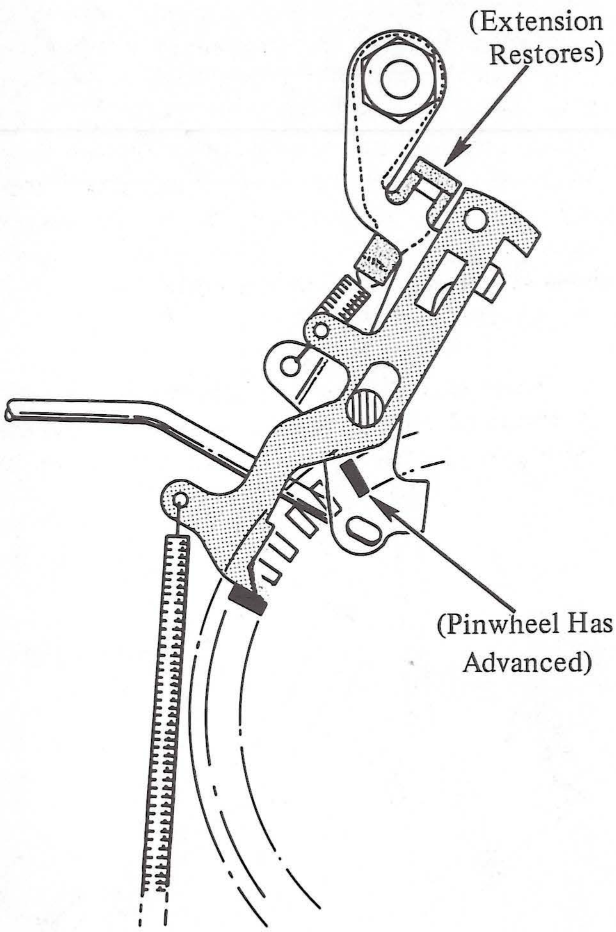


FIGURE 5-10E

During either a carrier return or tab operation the escapement pawl must be disengaged and held out of the pinwheel. This is necessary during a "homing" operation which will be explained in the carrier return section. At this time we only want you to understand how the pawl release lever disengages the pawl from the pinwheel. The pawl release lever mounts on the escapement pawl mounting pin. The left side of the pawl release lever fits into one of the guide slots in the escapement pawl block (Fig. 5-11). A formed lug on the left arm of this release lever extends beneath the escapement pawl. When a pawl release operation is called for, this lever is rotated clockwise by applying a downward force to the elongated slot located in the right hand arm. This causes the lug that is resting beneath the escapement pawl to lift the pawl out of engagement with the pinwheel. The pawl then remains disengaged until the pawl release lever is restored back to its rest position. It is the position of the pawl bite setter that limits how far the escapement pawl engages the pinwheel after an escapement operation.

The last items to be explained on the escapement pawl block assembly are the backspace holding pawl and the latch on the tail of the escapement pawl. Because a backspace operation is achieved by rotating the pinwheel in reverse one pin at a time a pawl that can hold on any pin is needed. This is the function of the backspace holding pawl since it will hold on either "set" or "cleared" pins. The escapement pawl cannot fill this requirement as it can only hold on those pins that have been "set".

This backspace holding pawl, which is mounted in the escapement pawl block by the escapement pawl mounting pin, operates in the mid-section of the pinweheel as shown in Figure 5-12. The mounting hole for this pawl is not elongated as floating action is not necessary in this operation. Like the escapement pawl, the amount of bite that this pawl takes on a pin is controlled by the lug on the pawl bite setter. During a "homing" operation, when the pawl release lever is rotated, the backspace holding pawl is also disengaged from the pinwheel.

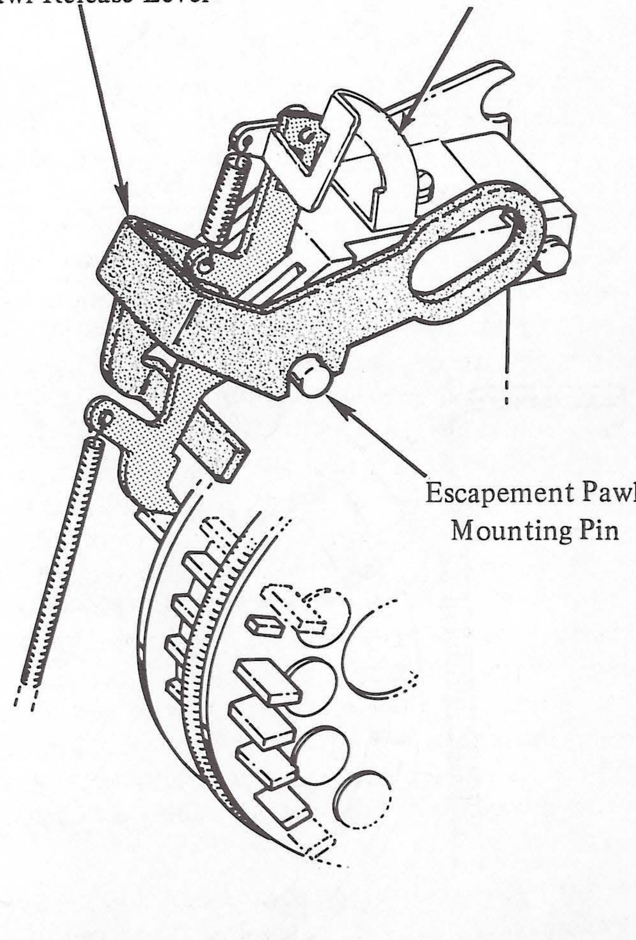


FIGURE 5-11

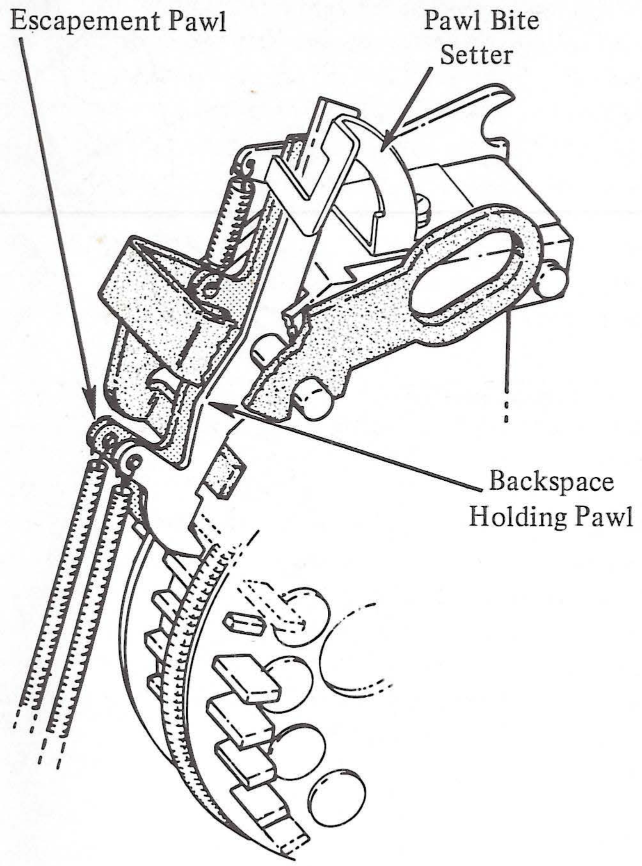


FIGURE 5-12

The backspace holding pawl presents a problem during an escapement operation. It must be tripped out with the escapement pawl and then held out until after the escapement pawl has been restored and engaged by the next set pin in the pinwheel. This action is accomplished by latching the backspace holding pawl out and then using the upward motion of the escapement pawl, as it is driven upward on its elongated mounting hole by the pinwheel, to unlatch the backspace holding pawl so that it may restore back into the pinwheel. This latching operation assures that the pinwheel will always come to rest on the escapement pawl at the end of an escapement operation. The backspace holding pawl should never hold the pinwheel except after a backspace or homing operation. Since the backspace holding pawl is designed approximately .003" shorter than the escapement pawl, the escapement pawl will always do the holding as the pinwheel comes to rest after an escapement operation. Because of the floating action of the escapement pawl the backspace holding pawl will always end up holding after a backspace operation.

Let's get back to how the backspace holding pawl is latched out during an escapement operation. The backspace holding pawl is tripped out simultaneously with the escapement pawl by the trip lever extension. As soon as the escapement pawl clears the pin in the pinwheel the tail of the escapement pawl floats down and forward from behind the trip lever extension. This permits it to re-engage the pinwheel. When this happens the tail of the escapement pawl moves into the restoring path of the trip lever so that the trip lever cannot restore. With the trip lever held in its active position the trip lever extension keeps the backspace holding pawl disengaged from the pinwheel. As the pinwheel drives the escapement pawl back on its elongated mounting hole the trip lever is released allowing the holding pawl to re-enter the pinwheel.

Observing Figure 5-13A),you can see that as a pull is produced on the escapement trip link, the horizontal lug on the trip lever extension, which we have la-

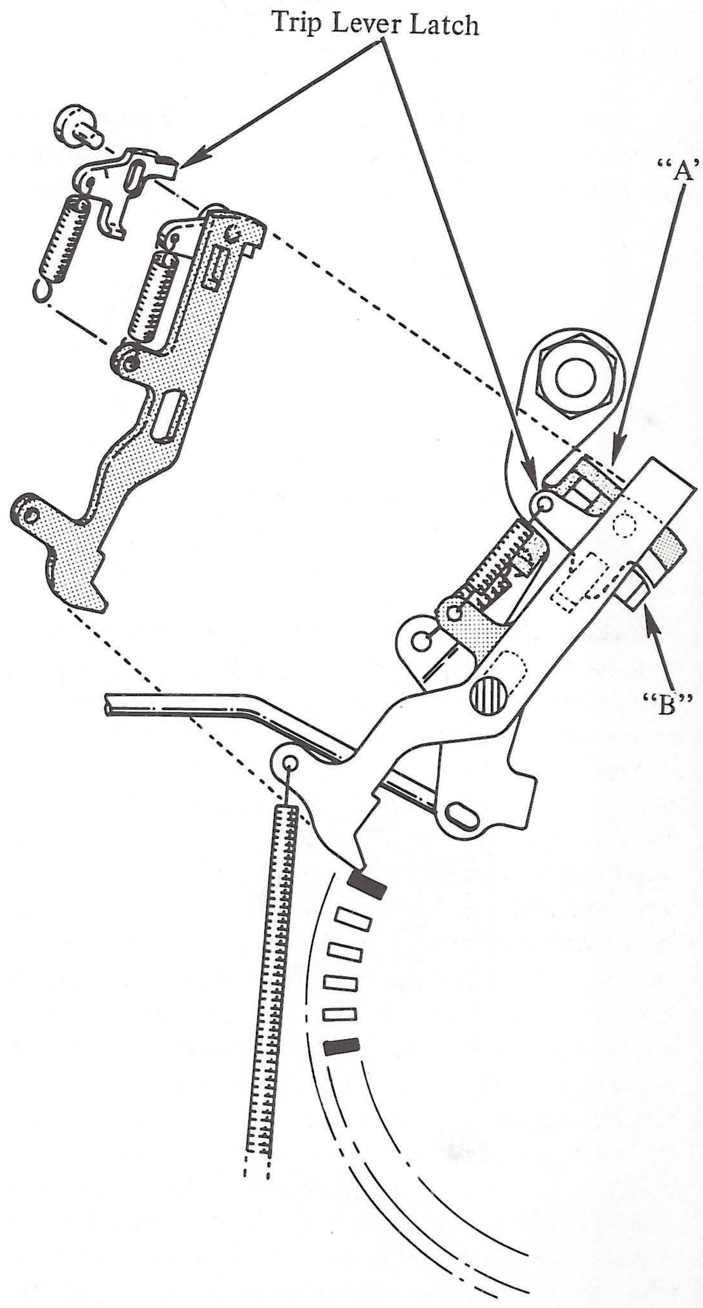


FIGURE 5-13A

beled lug "A", pushes on the tails of both the escapement pawl and the backspace holding pawl. This action causes both of the pawls to begin to rotate clockwise towards their released position. At the same time lug "A" is pushing on the tails of the pawls, lug "B", which is part of the escapement trip lever (Fig. 5-13A), is moving clockwise in unison with the pawls and lug "A".

Mounted just above lug "B" on the tail of the escapement pawl is the trip lever latch (Fig. 5-13A). The function of this latch, as you will see shortly, is to latch the escapement trip lever in its active position. The latch is mounted to the escapement pawl by a shouldered rivet. The mounting hole in the latch is elongated so that the latch can slide up and down on the escapement pawl. An extension spring anchored to the escapement pawl loads the latch into its rest position (Fig. 5-13A).

Once lug "A" has pushed the tail of the escapement pawl far enough for the tip of the pawl to clear the set holding pin in the pinwheel, the pawl then begins

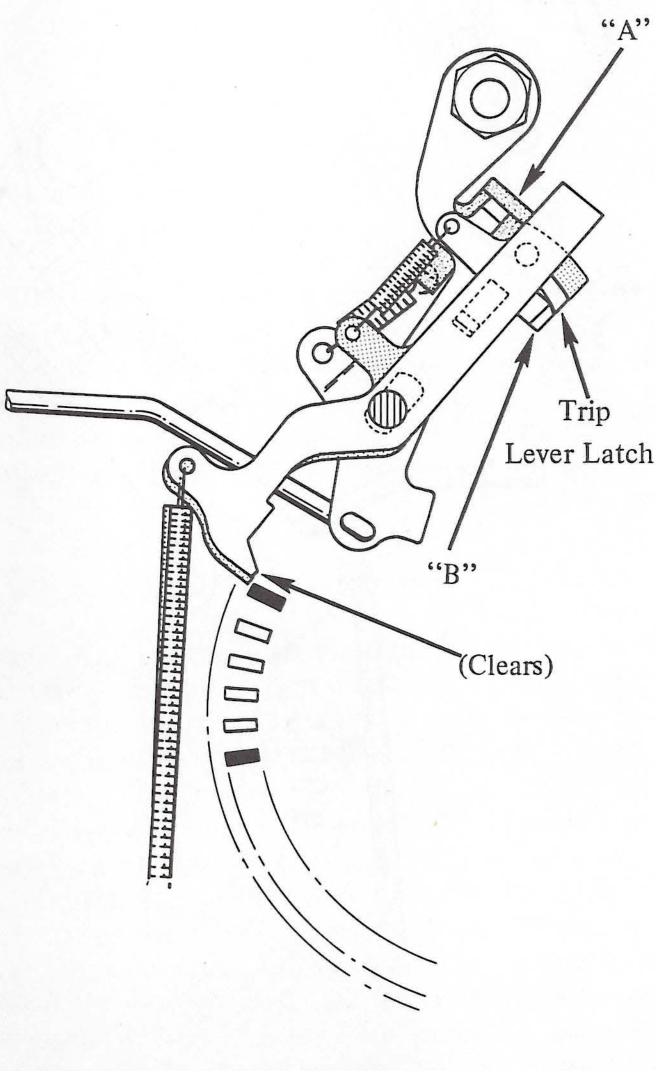


FIGURE 5-13B

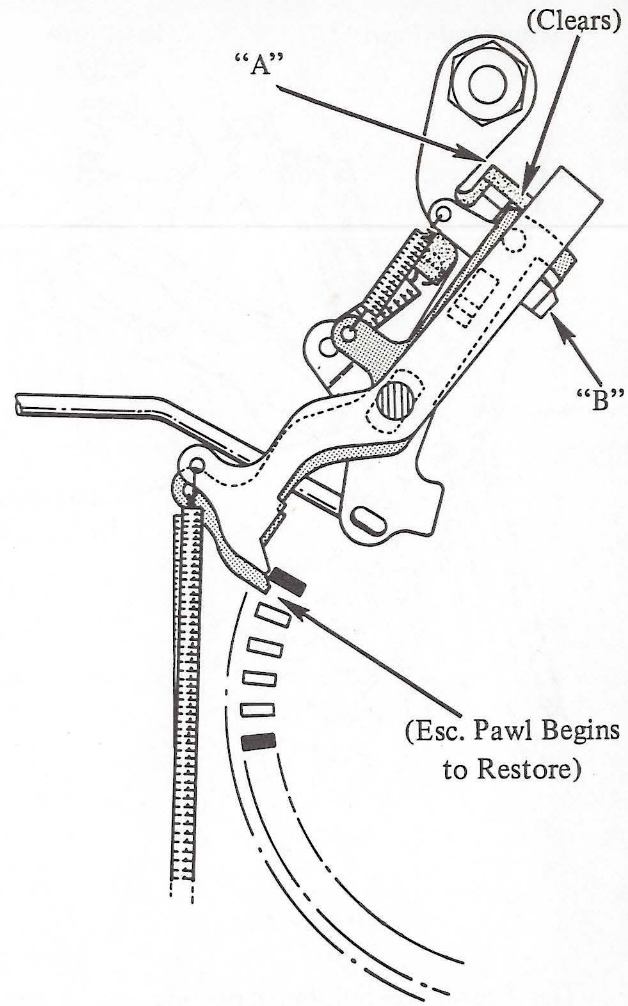


FIGURE 5-13C

to move down on its elongated mounting hole under the influence of its spring (Fig. 5-13B). The escapement pawl spring is much stronger than the light spring on the trip lever latch, therefore the escapement pawl continues to move down on its elongated mounting hole while the trip lever latch is restricted by lug "B" on the trip lever (Fig. 5-13B). As soon as the escapement pawl has moved down far enough for its tail to move out from beneath lug "A", the escapement pawl will begin to restore back into the pinwheel as shown in Figure 5-13C. When this restoring action occurs the tail of the escapement pawl begins to rotate counterclockwise away from and in the opposite direction that lug "B" is moving. As soon as the trip lever latch, which is being held loaded towards the tail of the escapement pawl by lug "B", clears lug "B" it will snap back to its rest position as shown in Figure 5-13D. With the latch in this position and the escapement pawl in its down or forward position; lug "B", which is part of the escapement trip lever, will be restricted from restoring as shown in Figure 5-13E Thus, the backspace holding pawl is latched out.

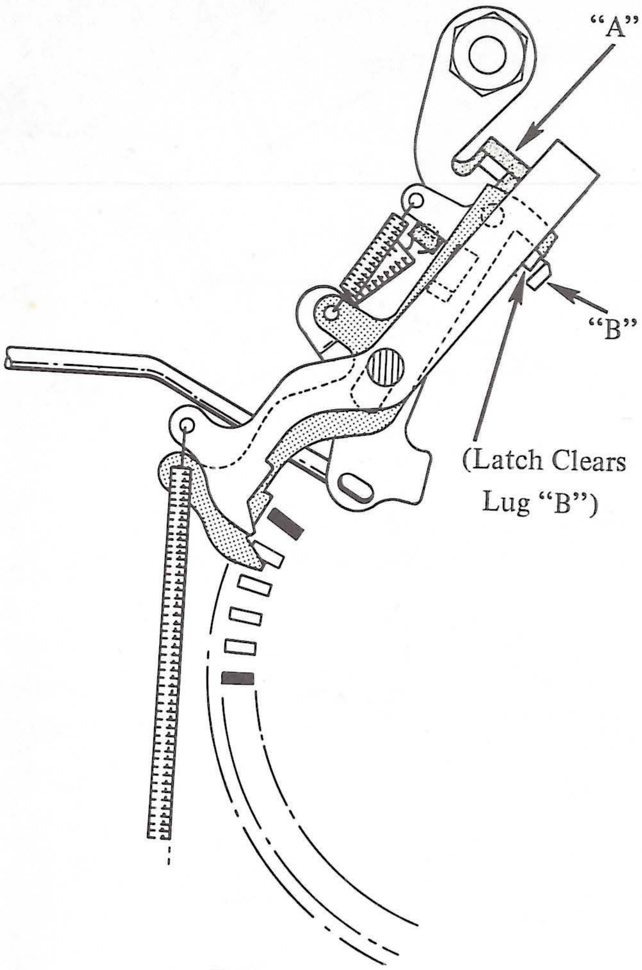


FIGURE 5-13D

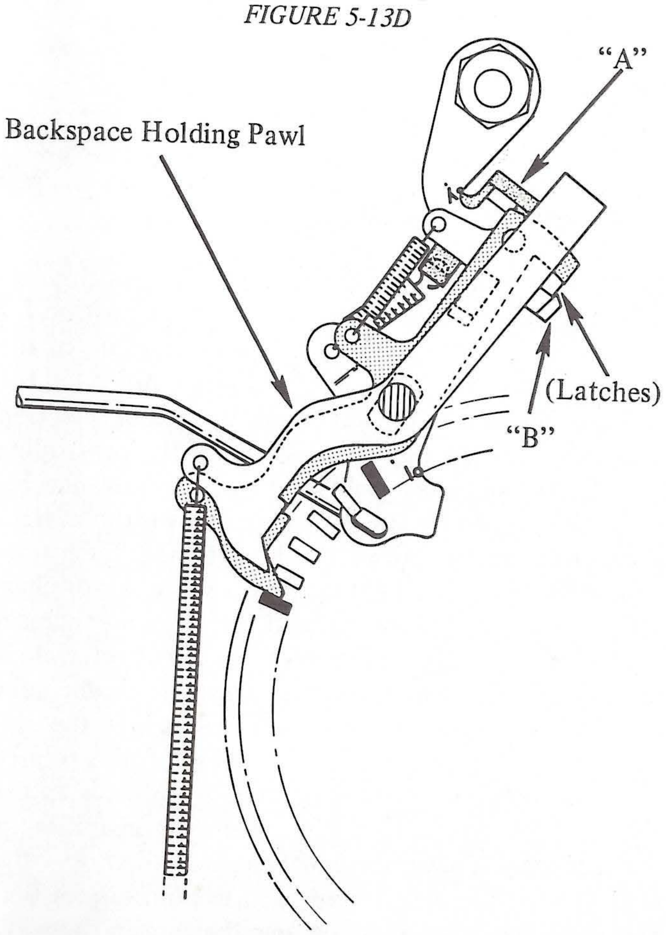


FIGURE 5-13E

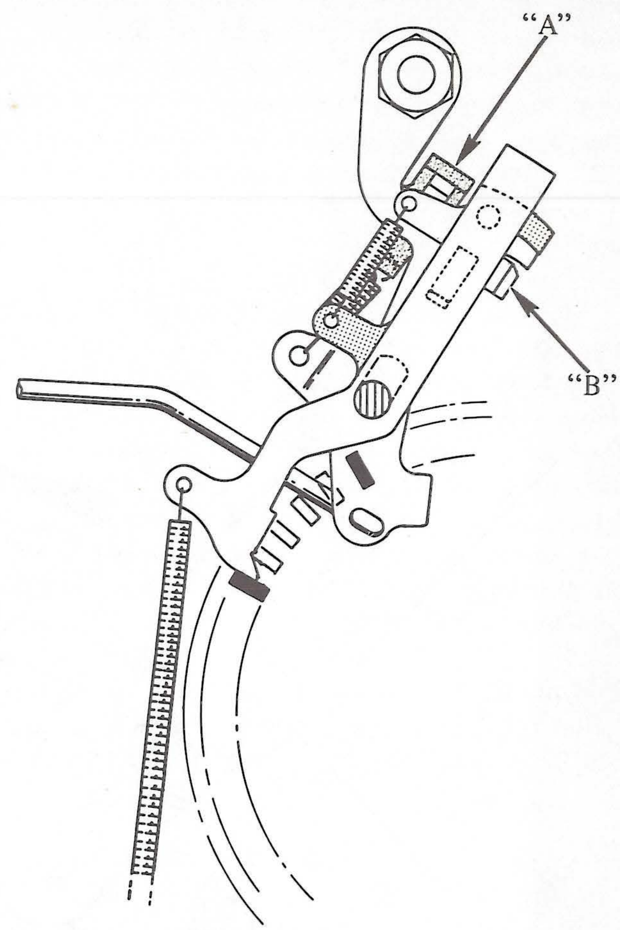


FIGURE 5-13F

As soon as a set pin in the pinwheel begins to drive the escapement pawl on its elongated mounting hole back to its holding position, the trip lever latch will move with it causing lug "B" to be released. Once lug "B" is released, both the trip lever and the backspace holding pawl return to their rest position as shown in Figure 5-13F. The backspace holding pawl is back into the pinwheel ready to perform its function should the next operation be either a backspace or homing operation.

During an escapement operation the pull that is produced on the escapement trip link to trip the pawls out of the pinwheel is developed by a double lobed cam on the filter shaft. This cam, called the escapement cam, is set screwed on the filter shaft directly above the tab/backspace operational bracket. As shown in Figure 5-14, the cam's motion is transferred to the escapement cam follower which pivots on a shaft mounted to the tab/backspace operational bracket. From there the motion is transferred to the clevis plate and on to the escapement link. In a normal escapement selection the three pieces of the dead key cam follower assembly act as one solid piece. Therefore, when the bottom of the cam follower goes to the rear, the top of the clevis goes to the front of the machine and a resulting pull is felt on the escapement link.

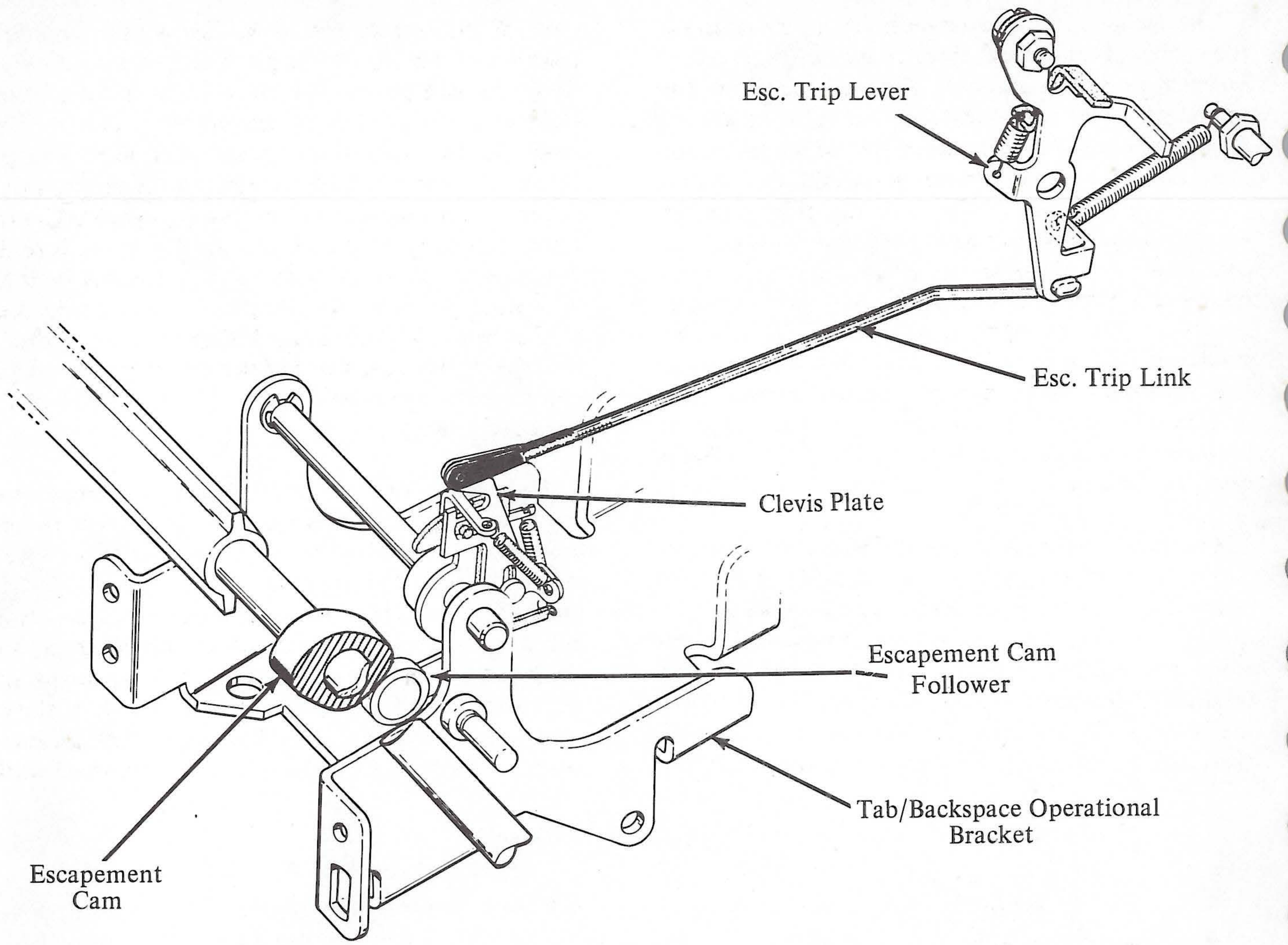


FIGURE 5-14

A dead key escapement cycle will be explained in the "Feature's" section of this manual.

Briefly reviewing what has been covered in this escapement control section; the carrier's escape motion is controlled by a leadscrew. This leadscrew, through a gear train, is coupled to a pinwheel. A spring bias mechanism located at the left end of the leadscrew is used to drive the entire system in the escape direction. An escapement pawl operating on the pins of the pinwheel controls the rotation of the pinwheel thereby controlling the escape motion to the carrier. A cam on the filter shaft trips the escapement pawl out of the pinwheel to initiate the escapement operation.

Two important points that should be mentioned at this time are: ball bearings are used throughout the system to hold friction down to a minimum (absolutely no binds can be tolerated); and all gears in the system are either keyed or set screwed to flat spots on their shafts. This is so that a fixed relationship can be maintained between the pins in the pinwheel and the threads on the leadscrew.

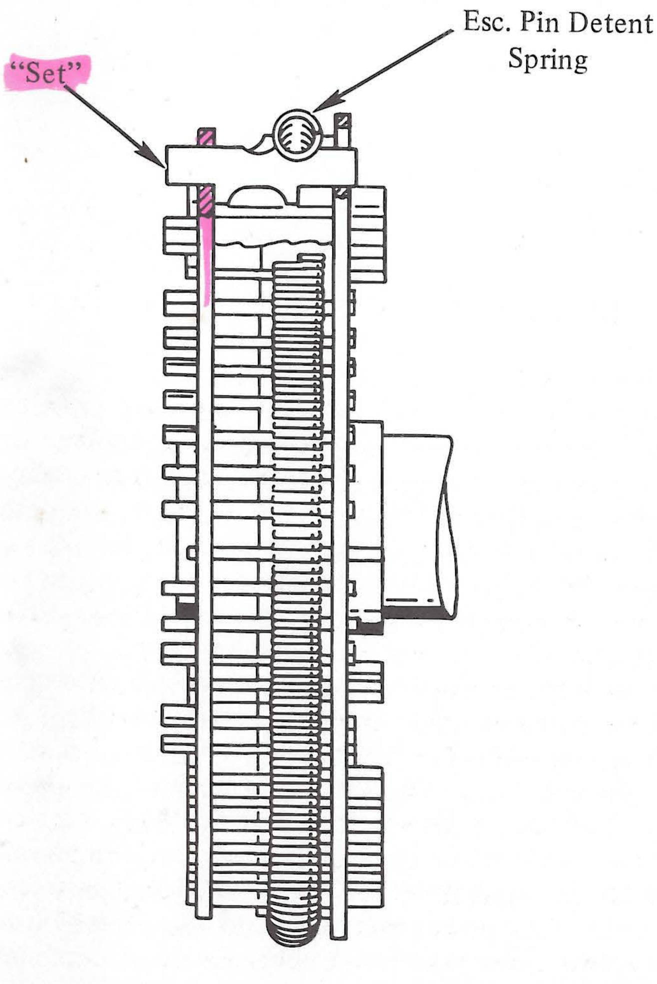
2. Escapement Selection

The function of the escapement selection mechanism is to set up the correct amount of escape motion for the carrier according to the escapement value of the character that has been chosen to print. Although the action is initiated at the keyboard, the actual selection is achieved at the pinwheel assembly. By controlling how far the pinwheel will be allowed to advance before it is stopped by the escapement pawl, the correct amount of carrier motion can be obtained. Each time a print cycle begins, whether it be a space bar or character operation, the escapement selection mechanism begins its cycle. The function of this selection cycle is to program the pinwheel so that when the escapement pawl is tripped out after the typehead prints, the pinwheel will advance the correct number of pins to produce the required number of units of motion to the carrier. This means that the entire responsibility of the escapement selection mechanism is to choose the next pin for the escapement pawl to hold on, set that pin, and clear any other set pins that are in the way.

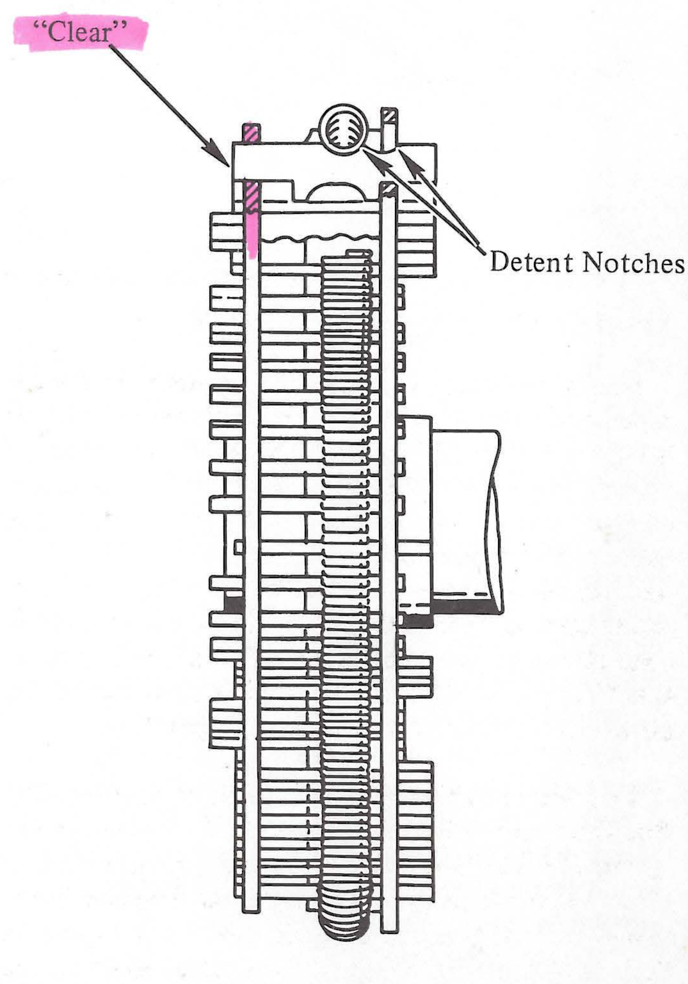
The escapement requirements for all characters in the keyboard range from three to nine units. A unit of escapement is that amount of motion that would be produced to the carrier if the pinwheel were allowed to advance only one pin. Since the minimum escapement value required of the keyboard is three units the pinwheel must always advance at least three pins during an escapement operation. With the maximum escapement selection being nine units, the pinwheel never advances more than nine pins during an escapement operation. This means that the escapement selection mechanism must be able to set any pin from three to nine pins ahead of the pin that the escapement pawl is holding on. It must also be able to clear any or all of the pins from one to eight pins ahead of the pin that is doing the holding.

The pinwheel, which carries the 60 escapement pins about its periphery, consists of a slotted nylon wheel sandwiched between two metal support wheels. Each one of the sixty escapement pins is mounted in the wheel in a manner so that it may be slid laterally left or right. If the pin is slid to its left position as shown in Figure 5-15A, the left end of the pin will extend beyond the left face of the pinwheel placing it in the path of the escapement pawl. This is called the SET position of the pin. If the pin is slid back to the right as shown in Figure 5-15B, its left end will be nearly flush with the left face of the pinwheel. The pin is no longer in the path of the escapement pawl. This position is called the CLEAR position. A garter spring, called the escapement pin detent spring, encircles the outer periphery of the pinwheel. Its purpose is to detent all sixty of the escapement pins in either their set or cleared position. This detenting effect can be seen in Figure 5-15A and B. By lifting the right end of a pin, overcoming the force of the garter spring, the pin can be easily removed out the right hand side of the pinwheel (Fig. 5-15).

The process of setting and clearing the proper pins to produce an escapement selection from three to nine units is accomplished by a pin set and clear mechanism mounted directly in front of the pinwheel. This mechanism, which is usually referred to as the chopper block assembly, consists of a stack of pin set and clear interposers that straddle the escapement pin section of the pinwheel immediately ahead of the escapement pawl (Fig. 5-16). The stack of pin set interposers lie on the right hand side of the pinwheel while



"A"



"B"

FIGURE 5-15

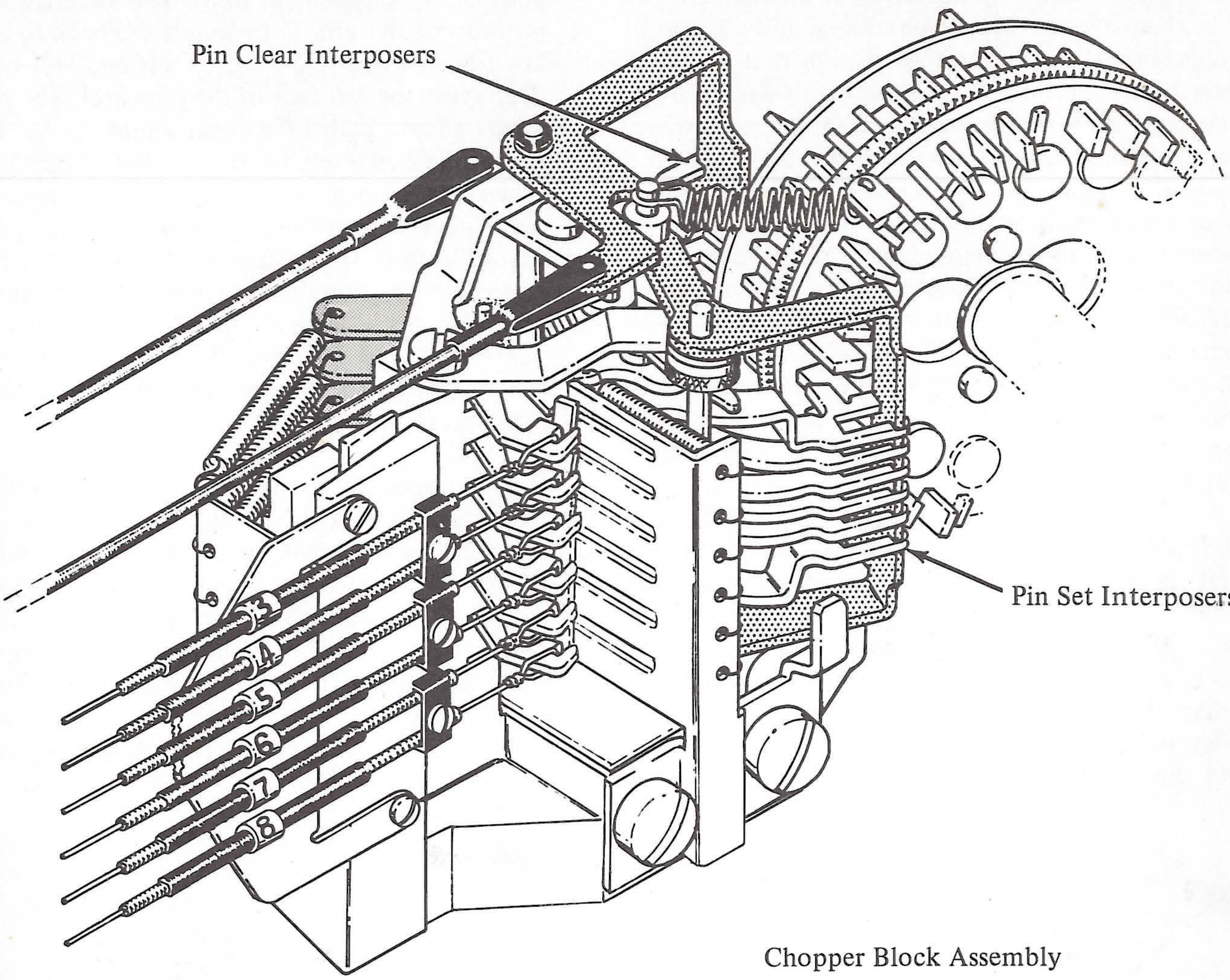


FIGURE 5-16

the stack of pin clear interposers lie on the left hand side. The function of the pin set and clear interposers is to set and clear the proper pins so that the pinwheel will be programmed for the correct escapement when the escapement pawl is tripped out.

The operation of the pin set and clear interposers is as follows: When the machine is at rest, each one of the pin set and clear interposers is resting clear of the pinwheel as shown in Figure 5-17A. In this position the lug on the pin clear interposer is in line with an escapement pin in the pinwheel. The lug on the pin set interposer is not in line but resting forward of the same escapement pin in the pinwheel. This means that if both of these interposers are rotated into the pinwheel while in this position a pin clear operation would result. This clearing operation is shown in Figure 5-17B.

If the interposer connecting link is unlatched by pulling on the escapement cable, as shown in Figure 5-17C, then the spring load on the interposer connecting link causes the link to pivot on its mounting stud. This action results in a reversal of the positions of the set and clear interposers. When this happens the pin set interposer becomes aligned with the escapement pin while the lug on the pin clear interposer shifts forward out of the way. Rotating the set and clear interposers into the pinwheel while in this position will result in a pin set operation (Fig. 5-17D).

This is exactly how escapement selection is accomplished. When the machine is at rest all of the interposer connecting links are held latched as illustrated in Figure 5-17A. This means that none of the pin set interposers are aligned to set a pin and that every pin clear interposer is in position ready to clear its pin when operated. This being so, then all that is necessary to select a specific amount of escapement is to merely unlatch the proper interposer connecting link so that its pin set and clear interposers can reverse their positions. Once this is done then all of the pin

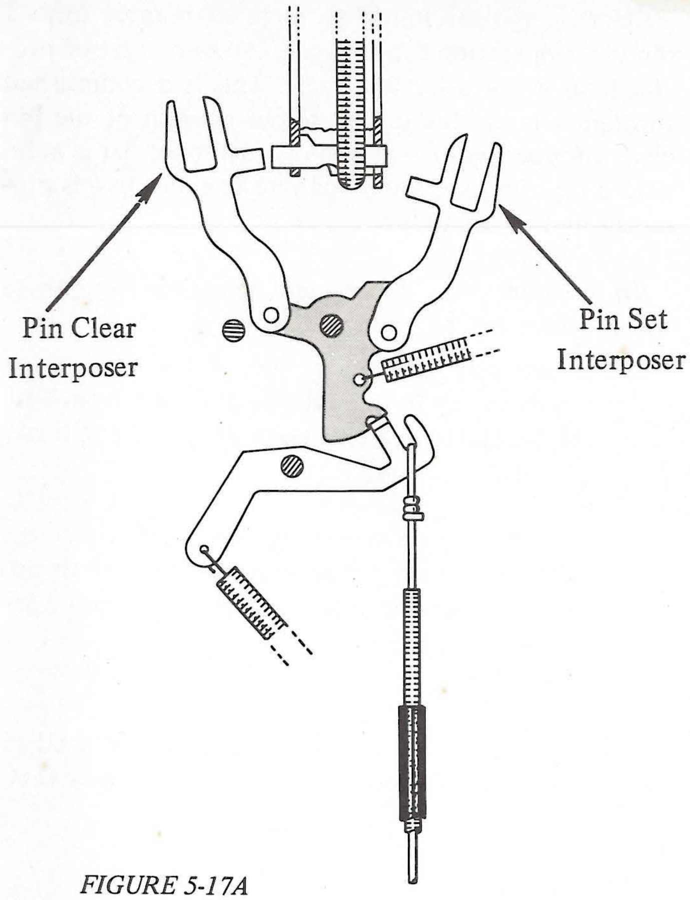


FIGURE 5-17A

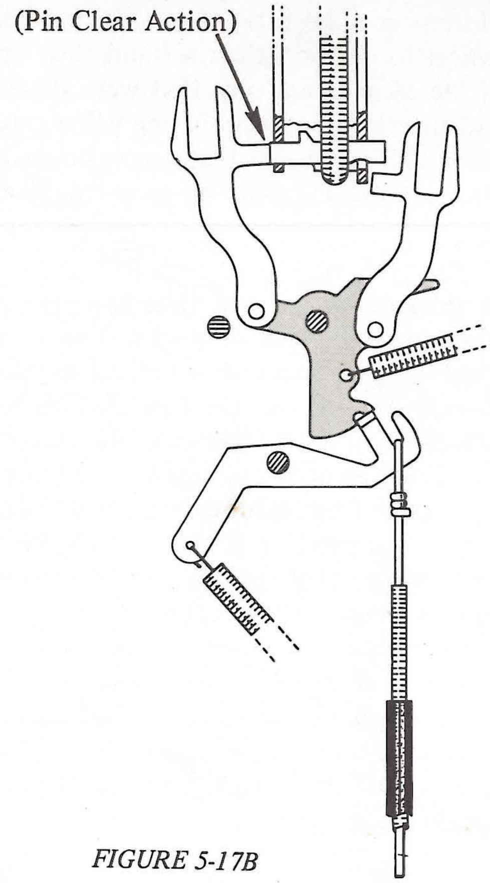


FIGURE 5-17B

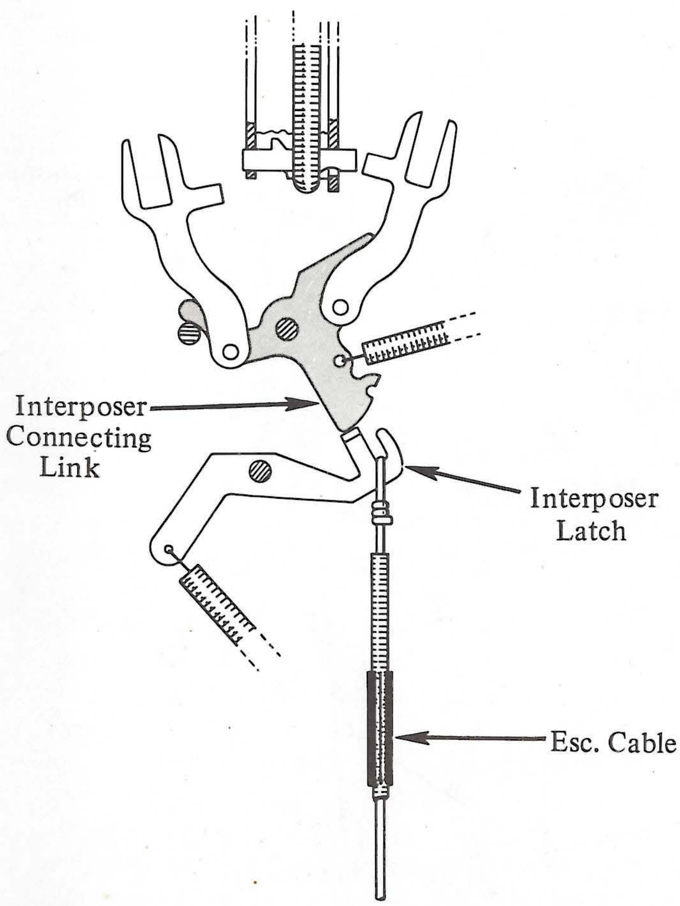


FIGURE 5-17C

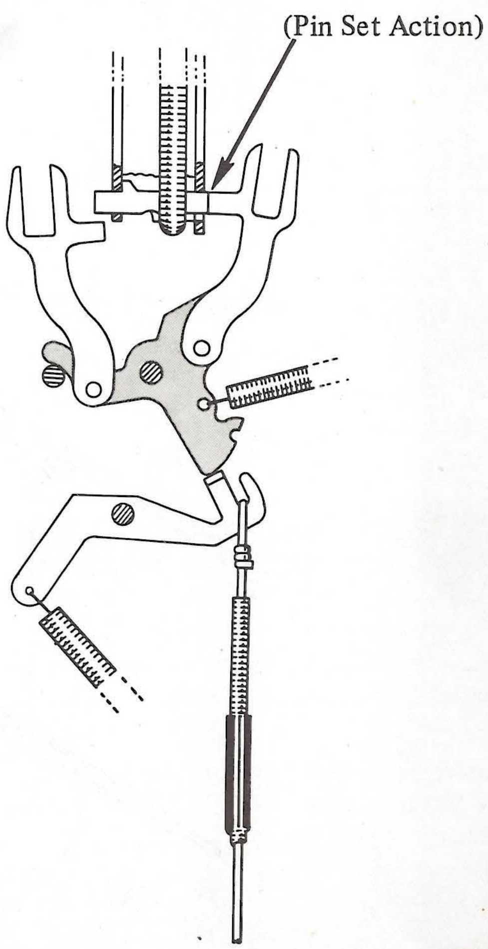


FIGURE 5-17D

set and clear interposers are rotated into engagement with the pinwheel to perform their set and clear operation. Of all the escapement pins that were aligned with the set and clear interposers only one will end up in a set position. This is the pin that was in line with the set and clear interposers that had been unlatched or reversed.

There are a total of six set and clear interposers mounted in the chopper block assembly. These six interposers, which are positioned ahead of the escapement pawl, provide control over the pins that are located from three to eight units away from the escapement pawl. Since no escapement selection requires that the ninth pin away from holding be cleared, a pin clear interposer in this position is not needed. Since setting the ninth escapement pin on every selection cycle would not interfere with selections from three to eight units and at the same time would provide a nine unit selection when needed, a permanent pin set operation for the ninth pin away from holding has been designed into the chopper block assembly. A lug on the lower portion of the pin set chopper bar performs this operation (Fig. 5-18).

Because the minimum escapement is three units a pin clear operation for pins one and two must be provided on every selection cycle. This is accomplished through a broad lug on the upper portion of the pin clear chopper bar. Every time the chopper bar is actuated a clearing operation for pins one and two is produced by this broad lug.

In summary, any escapement selection from three to nine units can be obtained by:

a. Selectively pulling on one of the six escapement cables to unlatch the desired pin set and clear interposer. This is for pin positions three through eight only.

b. Not pulling on any of the escapement cables. This will cause a nine unit escapement to occur because the ninth pin is set on every selection whether it is needed or not.

The six pin set and clear interposers are riveted to their interposer connecting links by shouldered rivets.

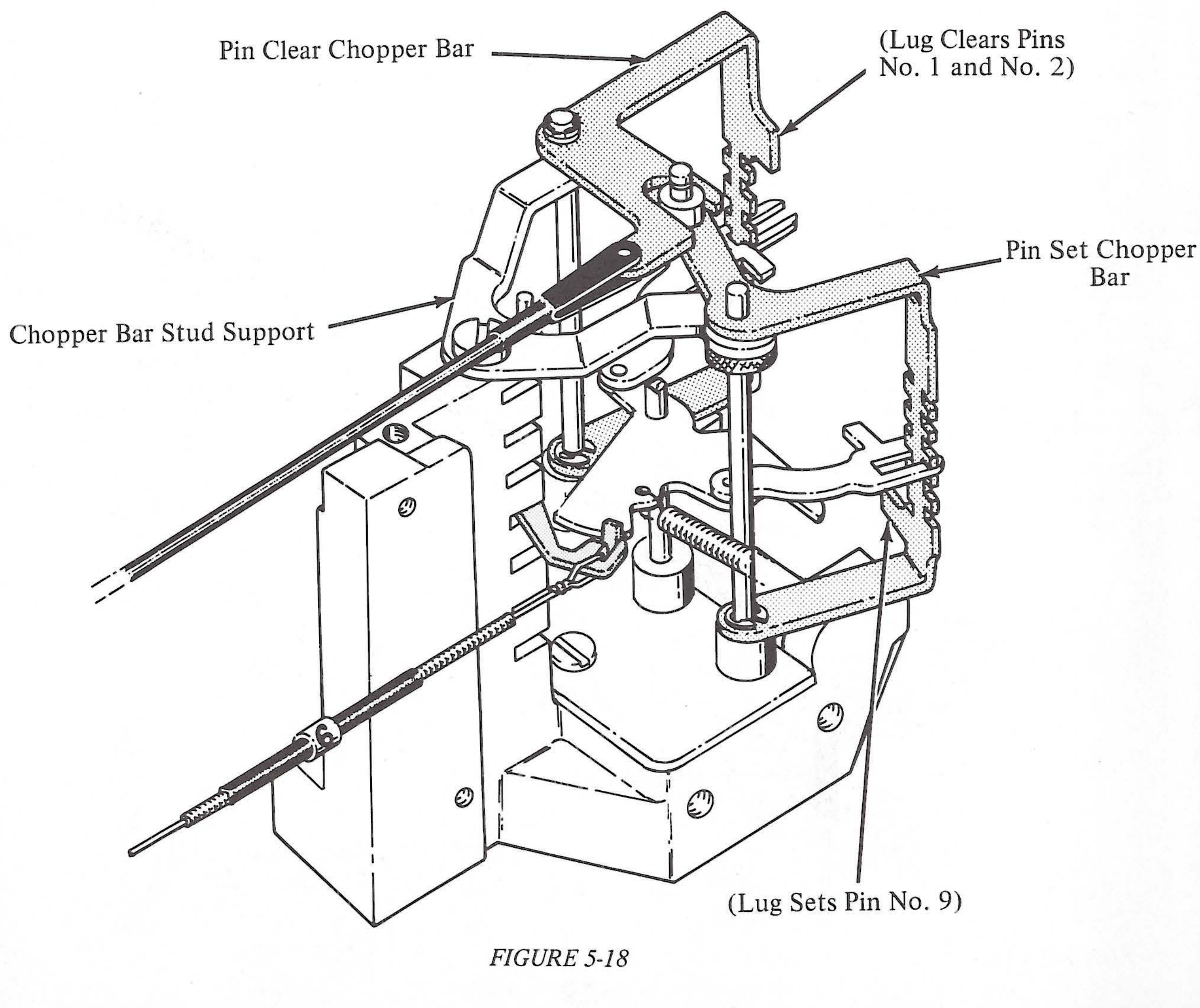


FIGURE 5-18

These six connecting links are then stacked on a long vertical pivot stud which is secured to the base of the chopper bar block (Fig. 5-18). C-clips and lubrication pads serve to maintain the proper vertical spacing of these connecting links. The ends of the pin set and clear interposers are forked where they connect with the pin set and clear chopper bars. The guide slots in the chopper bars keep the interposers in their correct vertical position.

The function of the chopper bars is to scissor the set and clear interposers into the pinwheel so that they may perform their set and clear function. The chopper bars pivot on two long vertical studs that are secured to the base of the chopper bar block. C-clips on the lower portion of these pivot studs and a C-Clip above the clear chopper bar retain the chopper bars in position. A yoke shaped piece called the chopper bar stud support provides stability to the top of the two chopper bar mounting studs (Fig. 5-18). This support is anchored to the chopper bar block by one screw and a three holed strap that fits over the two chopper bar mounting studs and the interposer connecting link mounting stud provides stability to the center stud.

A link connected to the top of the pin clear chopper bar supplies the motion to scissor the two chopper bars into the pinwheel during a pin set and clear operation. When a pull is produced on the link, the pin clear chopper bar rotates clockwise. This rotation of the pin clear chopper bar drives the pin set chopper bar counterclockwise. This driving action between the two chopper bars is gained through a stud riveted to the upper arm of the pin set chopper bar. This stud, which has a roller to reduce friction, fits into a slot in the pin clear chopper bar directly behind where the chopper bar link is connected (Fig. 5-18).

The chopper bar link receives its motion from a double lobed cam on the filter shaft. This cam is set screwed to the filter shaft to the right of the escapement cam. A cam follower mounts on a stud on the right side of the tab/backspace operational bracket (fig. 5-19). An extension spring loads this follower against the cam. The cam is timed so that the chopper bars will begin to scissor in on the pinwheel as soon as the selected pin set and clear interposers have been unlatched. Timing here is critical because the chopper bar action must be

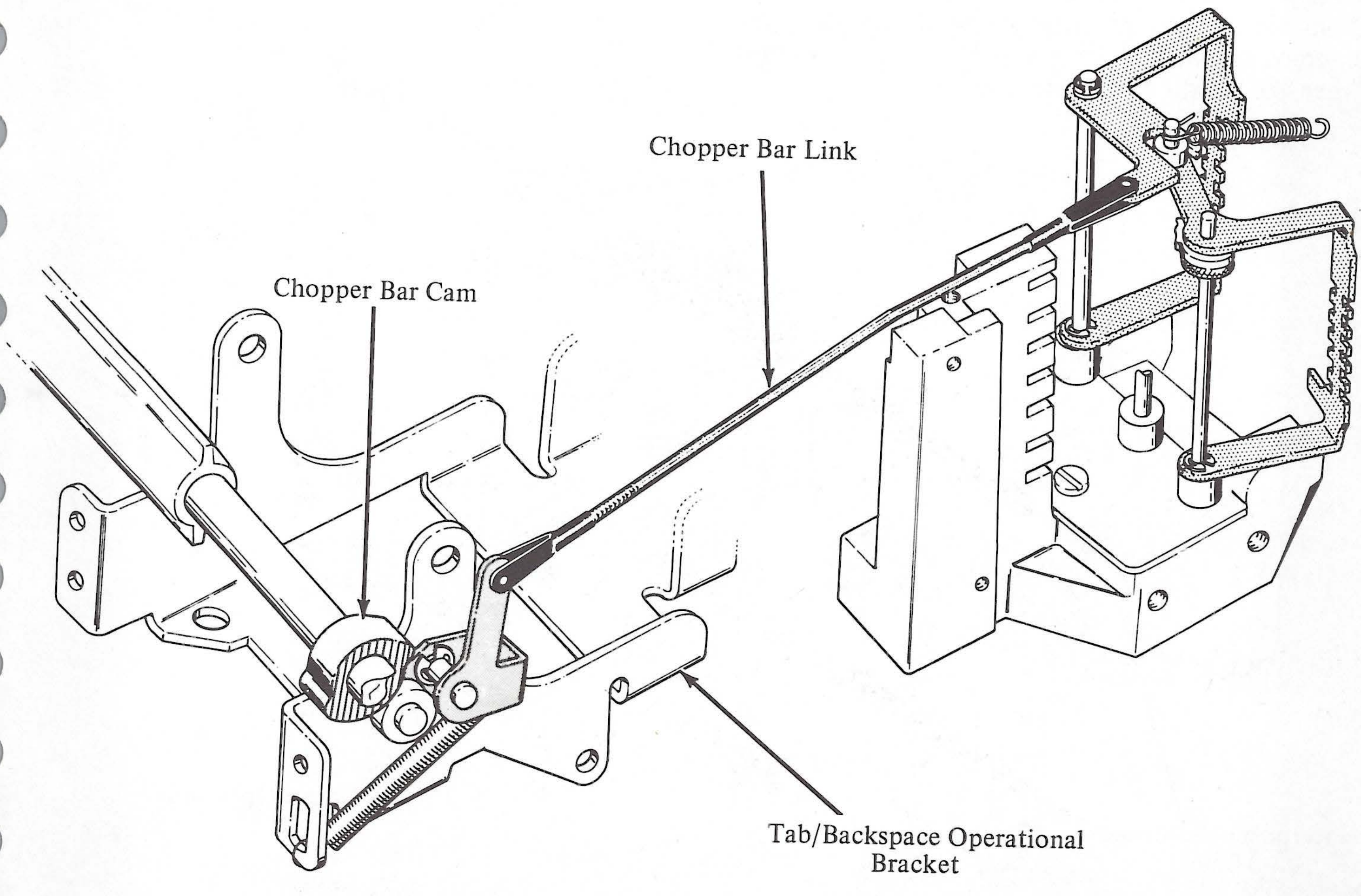


FIGURE 5-19

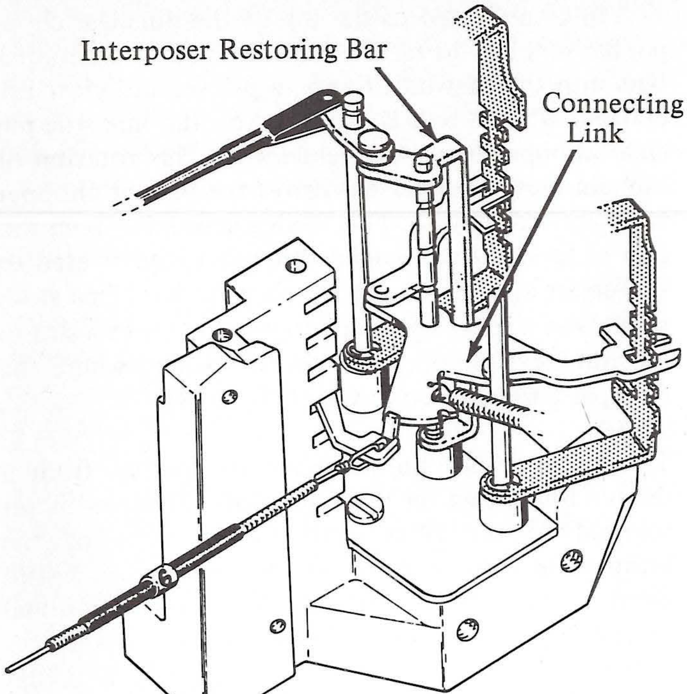


FIGURE 5-20

completed before the escapement pawl is tripped from the pinwheel; otherwise the pin set and clear interposers will still be engaged with the pinwheel when the pinwheel begins to turn.

Let's go back to the chopper block assembly. The six interposer latches are mounted in slots in the chopper bar block. A fulcrum wire that runs through a long vertical hole in the block serves as the pivot point for these latches. A C-clip located in the bottom slot retains this fulcrum wire in position.

Once the chopper bar action has completed, the pin set and clear interposers that had been unlatched must be restored back to their latched position. This restoring action is achieved through an interposer restoring bar. As shown in Figure 5-20 this bar pivots on the interposer connecting link mounting stud in a manner such that when rotated clockwise it will engage and drive any of the six connecting links back to their rest position. The restoring action comes through the interposer restoring link. When a pull is produced on the link it causes the interposer restoring lever, which is mounted on the pin clear chopper bar mounting stud, to rotate counterclockwise. The right hand end of this lever is riveted to the restoring bar and thus causes the bar to rotate driving any unlatched connecting links back to their restored position.

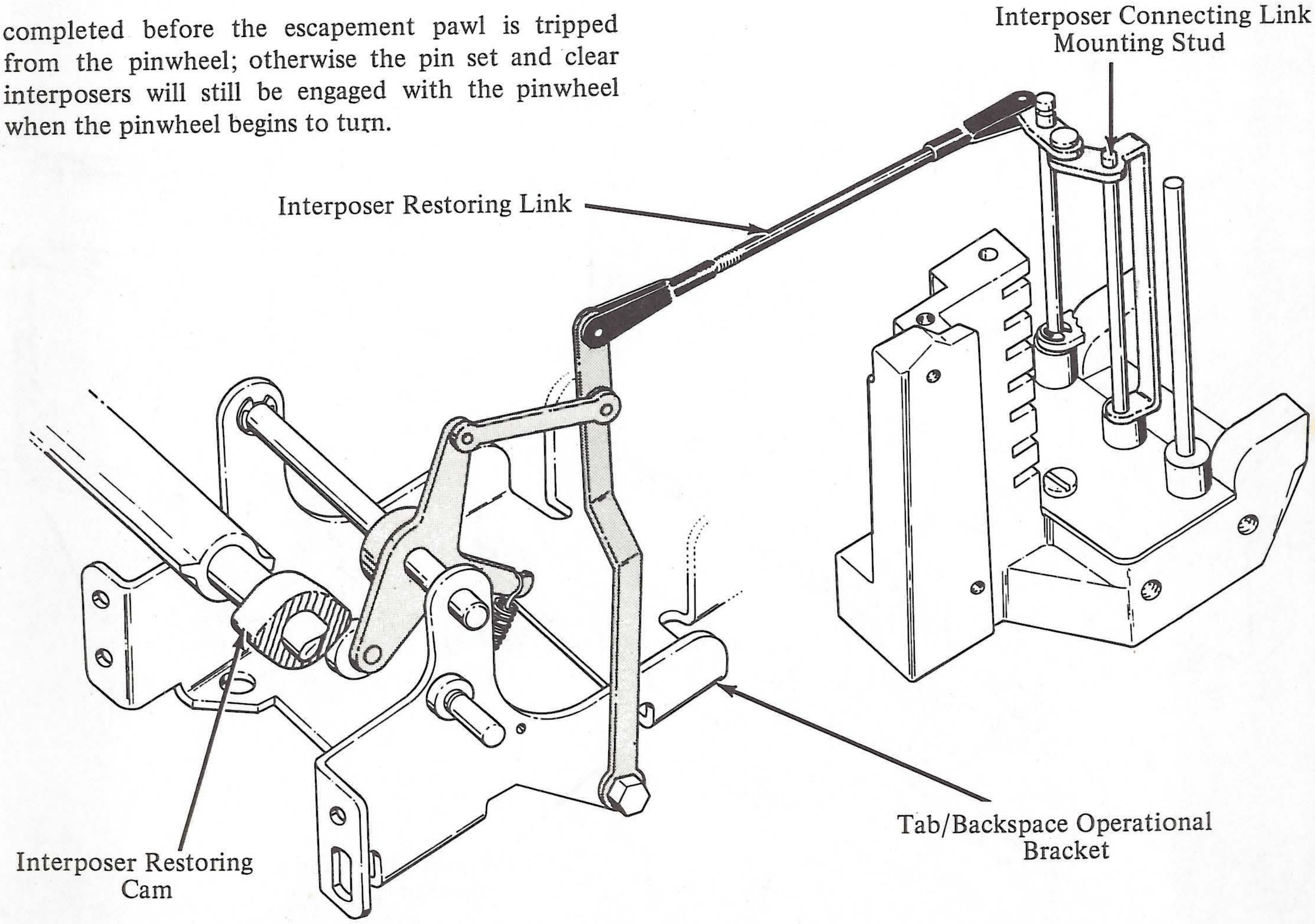


FIGURE 5-21

The interposer restoring link receives its motion from a cam on the filter shaft. This double lobed cam, called the interposer restoring cam, is set screwed to the filter shaft to the left of the escapement cam. The cam follower for this restoring cam pivots on a shaft that is mounted to the tab/backspace operational bracket (Fig. 5-21). This is the same shaft that the escapement cam follower pivots on.

The motion produced to the cam follower is transmitted to a multiplying lever by a short link as shown in Figure 5-21. The bottom of the multiplying lever pivots about a shouldered screw that is threaded into the right side of the tab/backspace operational bracket. The restoring link fastens to the top of this lever. This arrangement provides the proper amount of leverage to the restoring link without getting into an interference problem with the bottom of the carrier.

The interposer restoring cam is timed so that it restores the pin set and clear interposers as late as possible in the print cycle. When the machine is at rest the interposer restoring cam should be at its high dwell. This means that the interposer restoring bar is holding all of the interposer connecting links in a slightly over-restored position. This assures that there will not be any accidental triggering of an escapement selection between cycles. The interposer latches will not perform their function until a cycle begins. As soon as the filter shaft begins to rotate, the restoring cam follower will immediately move off the high dwell of the cam permitting all six of the interposer connecting links to settle against their respective latches. The chopper block assembly is now ready to receive an escapement selection from the keyboard.

Escapement selection is initiated at the keyboard. Six coded bails are mounted across the keyboard directly above the character interposers (See Keyboard Section). Each escapement code bail is linked to its respective interposer latch in the chopper block assembly by a sheathed cable. When a keylever is depressed a character interposer is placed into the path of the filter shaft. When the interposer is driven forward by the filter shaft, one of the selector lugs located along the top of the interposer rotates one of the six escapement code bails (unless a nine unit escapement were chosen.) This rotation of the escapement code bail through means of an arm attached on its right hand end, causes a pull to be produced on the escapement cable which in turn causes an unlatching action to the selected interposer connecting link (Fig. 5-22).

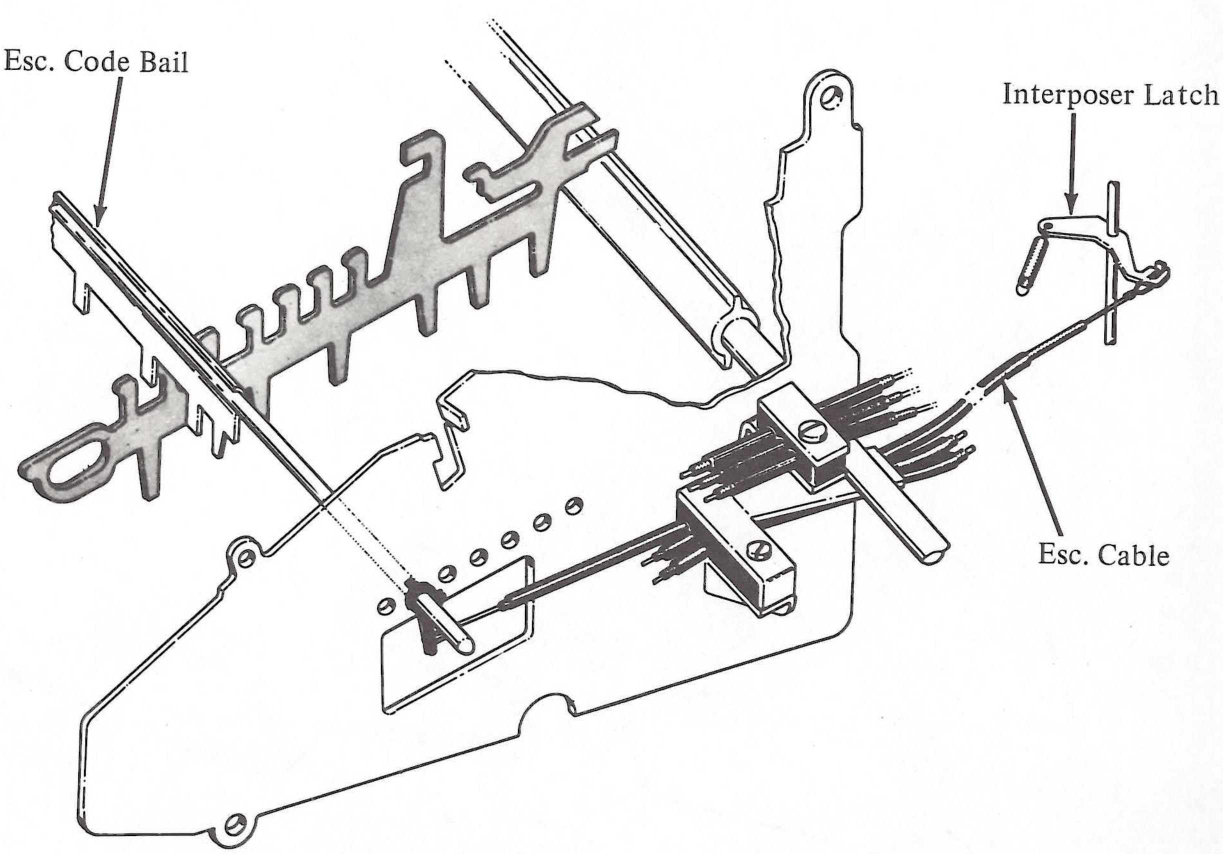


FIGURE 5-22

The escapement cables consist of a thin wire running through the center of a coiled wire sheath. All six cable sheaths, at the rear, are secured to a nylon guide block which is fastened to the chopper block assembly directly in front of the interposer latches. Three clamps, each held by a screw, anchor the sheaths to the guide block (Fig. 5-16). The cables are shielded from the rotating operational shaft as they pass forward by a portion of the plate that anchors the interposer latch springs. The forward end of each cable sheath is clamped by a bracket mounted on the keyboard sideframe. Rubber insulation on the bracket provides an even clamping action between the cables.

Both the front and rear end of each cable has a closed loop. The rear loop fits over a hook on the interposer latch while the front loop fastens to an arm which is attached to the right hand end of each escapement code bail (Fig. 5-22). This arm is made out of a tempered material similar to that of a grip clip. Its self-clamping action is what secures it to the escapement code bail.

To obtain the desired escapement selection for upper case characters, the six escapement code bails have been made shift seneitive. When the typehead is shifted into upper case the six escapement code bails in the keyboard are shifted to the left simultaneously. This causes a different set of coded tabs, located on the bails, to move into alignment with the selector lugs on the character interposers. The six code bails are spring loaded toward the right into their lower case position by compression springs located on their left ends. Each time the shift button is depressed into upper case a lever, called the bail shift lever, shifts all six escapement code bails to the left into their upper case position (Fig. 5-23).

The bail shift lever, which is mounted on the right hand keyboard sideframe, is operated by the shift arm through linkage. The interlock bellcrank riveted to a bracket mounted to the power frame, recieves motion from the bottom of the shift arm. From this bellcrank the motion is carried by the bail shift link to the shift lever bellcrank. The shift lever bellcrank is

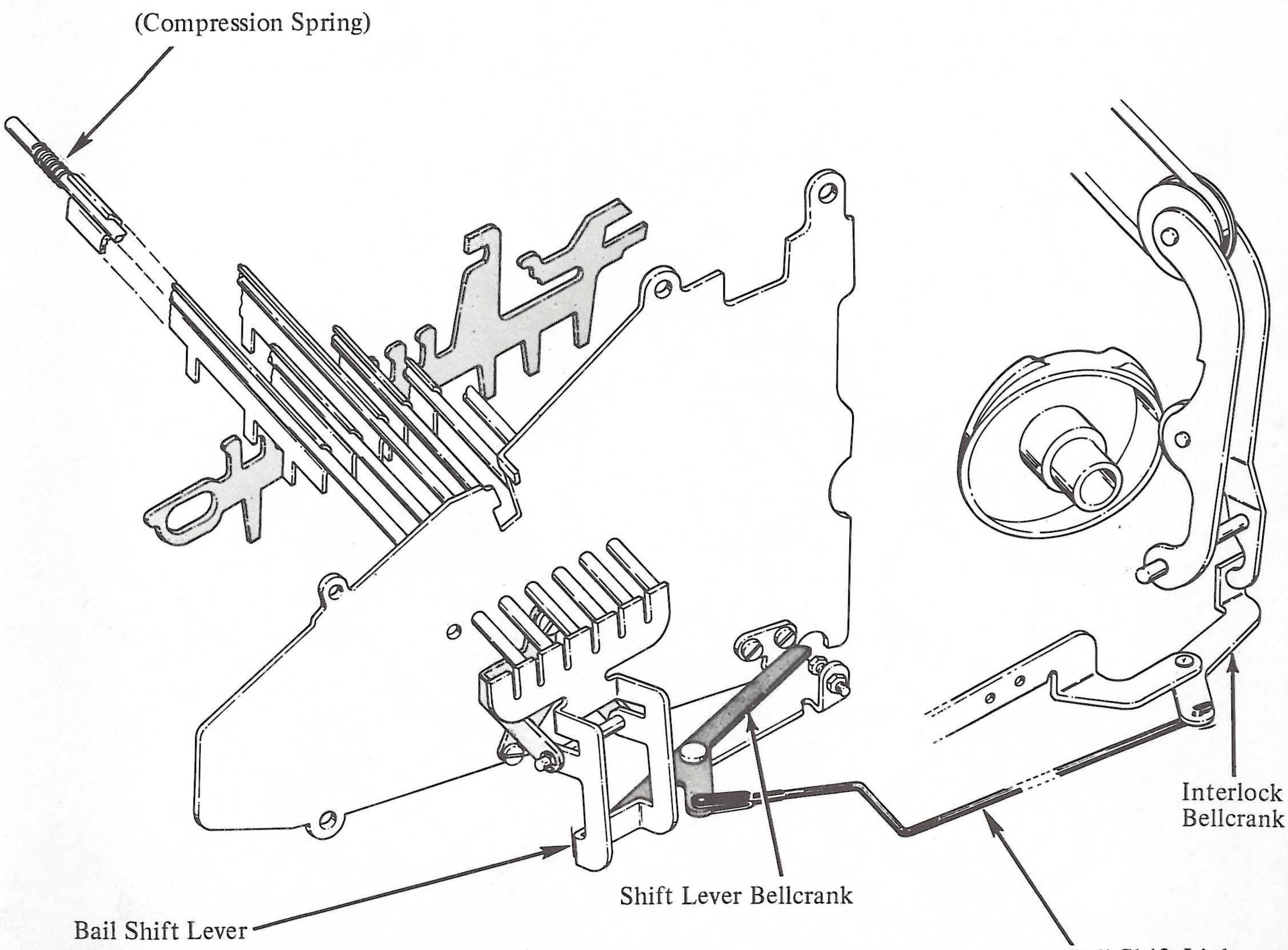


FIGURE 5-23

riveted to another bracket that is fastened to the keyboard sideframe by two screws. The shift lever bellcrank operates against the bottom of the bail shift lever shown in Figure 5-23. An adjustable stop screw that is contacted by the bellcrank in lower case serves as a lower case limit for the escapement code bails.

3. Leadscrew Bias Mechanism

The leadscrew bias mechanism, located on the powerframe at the left end of the leadscrew, delivers as nearly as possible a constant torque to the leadscrew. The magnitude of the torque developed is sufficient to allow the maximum escapement, which is nine units in the 1/72 pitch, to occur within the required time. The magnitude of the torque is also held down to a safe minimum to reduce impact and wear loads on the escapement system. Essentially, this torque is provided by a clock spring that is kept wound within a certain range by a rewind mechanism. This rewind operation is accomplished through two spring clutches; one to drive the spring in the winding direction and the other to check the spring so that it cannot unwind when the driving action has completed. The action here is similar to a Model C Standard ribbon feed mechanism.

The motion needed to rewind the bias spring is taken from the filter shaft gear. A small gear called the rewind drive gear mounts on a stud that is threaded into the machine powerframe directly below the filter shaft gear. This rewind drive gear, which is meshed with the filter shaft gear, rotates 360 degrees for every 180 degrees rotation of the filter shaft gear. Fitted into a slot of the drive gear is the rewind drive crank. When a print cycle is operated both the drive gear and the drive crank rotate together. A C-clip secures the drive gear and crank to the pivot stud (Fig. 5-24).

Attached to the end of the drive crank is a long link that extends back to an intermediate bellcrank that also pivots on a stud mounted on the machine powerframe. This link is called the rewind drive link (Fig. 5-24). Each time a print cycle occurs the rewind drive gear is driven 360 degrees creating an oscillating action to the intermediate bellcrank. This oscillating action is then carried by a second link up to the driving bellcrank which is set screwed to the driving arbor on the inside of the powerframe. Each stroke produced on the driving bellcrank by the oscillating (push-pull) motion results in a minimum of 90 degrees rotation to the driving arbor. It is this 90 degree rotation of the driving arbor (on the forward stroke) that produces the rewind action to the bias spring.

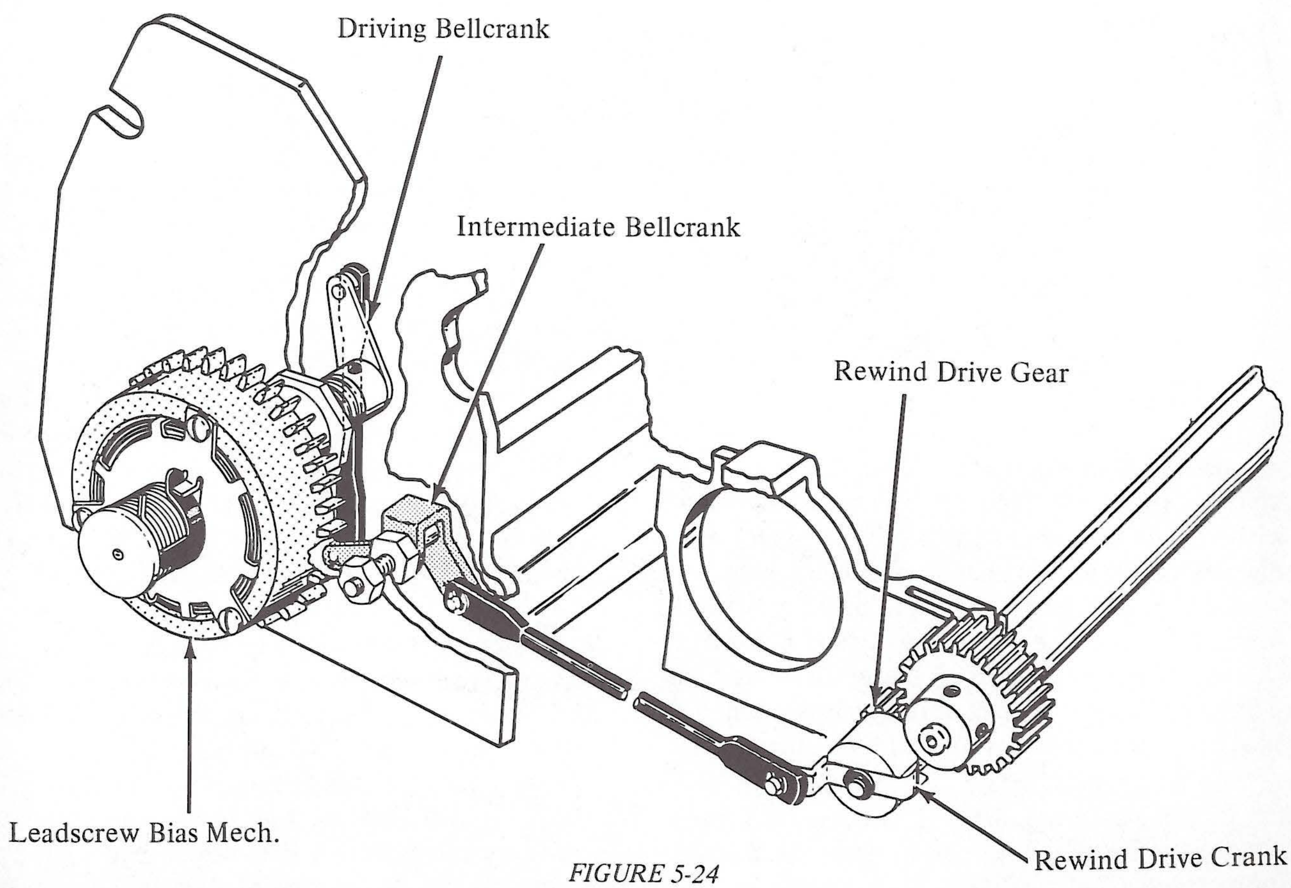


FIGURE 5-24

From Figure 5-25 you can see that as the driving bellcrank is rotated counterclockwise the hub at the left end of the driving arbor rotates in the direction that will cause the driving spring clutch to tighten. This causes the driving action to be carried through to the bias spring arbor. Since the innermost loop of the bias spring is anchored to this arbor a winding action to the bias spring results. The outermost loop of the bias spring is anchored to the rewind gear which is meshed with the left hand leadscrew gear. Therefore, the escapement pawl in the pinwheel is opposing the torque that is being developed by the bias spring.

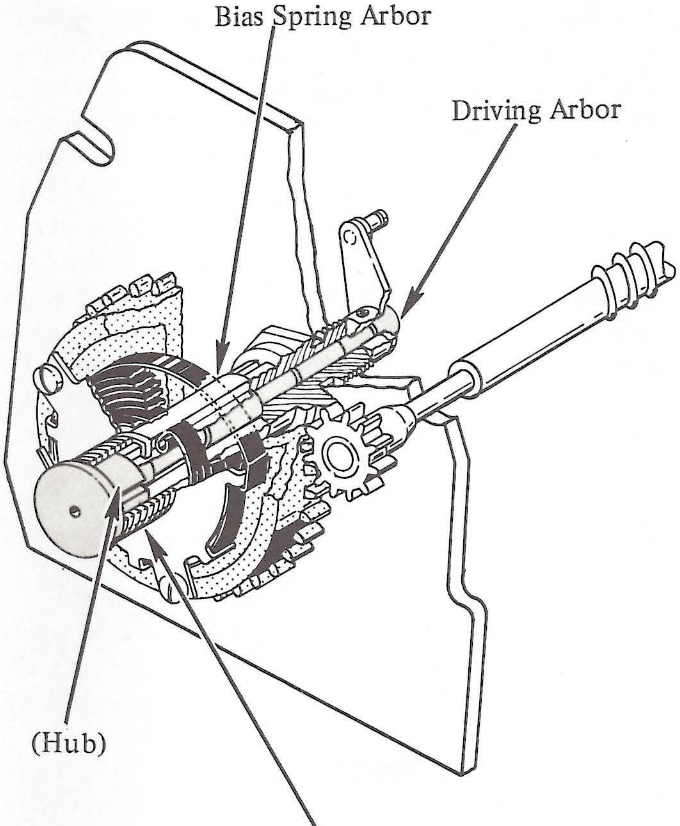


FIGURE 5-25

As the driving arbor rotates in the winding direction the driving spring clutch and the bias spring arbor rotate with it. The rewind gear, which is stationary during this rewind operation, has a stop lug, called the driving spring release arm, extending into the path of the formed end of the driving spring clutch (Fig. 5-26). Once the formed end of the spring clutch is driven into contact with this spring release arm the driving action between the arbor and the spring clutch ceases. The arbor slips within the spring clutch as it finishes its driving stroke. When this occurs it means that the bias spring has been wound to the desired maximum torque.

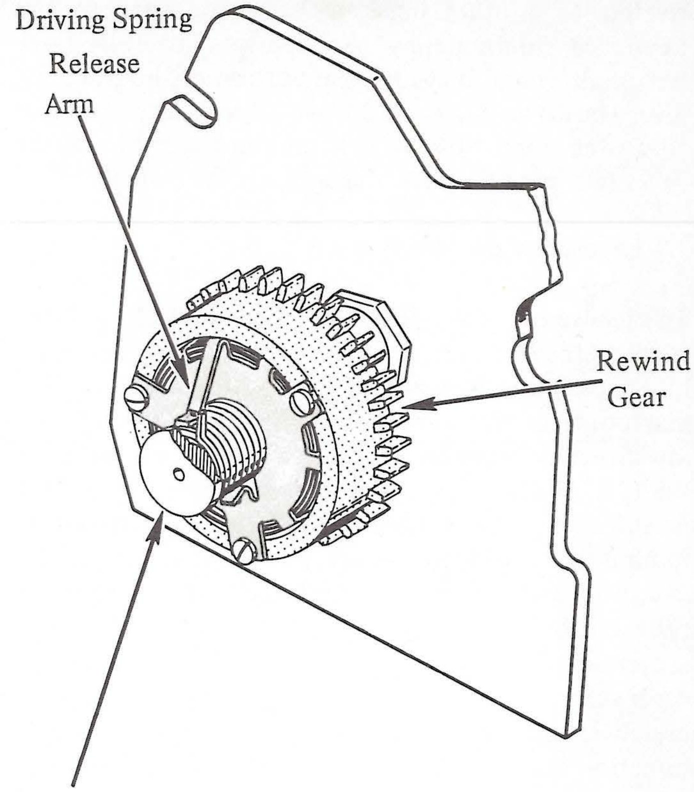


FIGURE 5-26

At the end of the driving stroke the driving bellcrank and arbor reverse their direction and rotate 90 degrees back to their rest position. When this happens unless something checks the bias spring arbor in its wound position it too will restore back to its rest position, allowing the bias spring to unwind. This checking action is the function of the holding spring clutch (Fig. 5-27). It holds the bias spring arbor in the wound position while the driving arbor restores back to rest. During the driving or winding stroke the bias spring arbor turns in the direction that tends to unwind the holding spring clutch. This permits the arbor to slip freely within the holding spring clutch. As soon as the bias spring arbor attempts to restore with the driving arbor the holding spring clutch tightens, locking the bias spring arbor to the holding clutch arbor (Fig. 5-27). During this restoring stroke the driving arbor is turning in the direction that tends to unwind the driving spring clutch. This permits the driving arbor to slip freely within the driving spring clutch.

During a backspace operation the leadscrew is rotated in reverse causing the rewind gear to be driven top to the front This simply causes a winding action to the bias spring. No problem is created by this action until the bias spring is wound to its desired torque which is when the driving spring release arm comes in contact with the formed end of the driving spring clutch. At this point, continued operation of

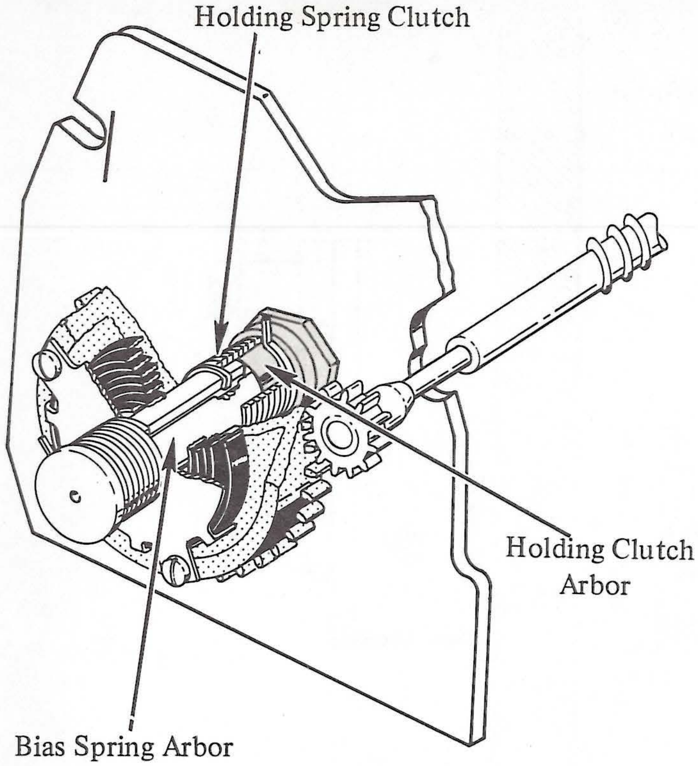


FIGURE 5-27

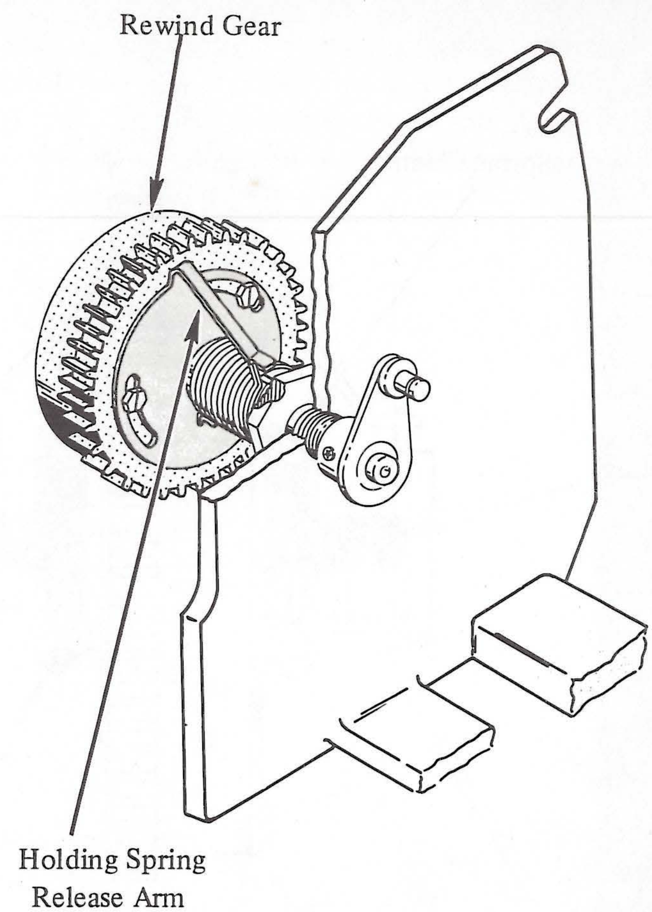


FIGURE 5-28

the backspace causes the spring release arm to rotate the driving spring clutch with it. Since the right hand end of this spring clutch has a turned down lug which fits into a slot in the bias spring arbor (the same slot that anchors the innermost loop of the bias spring), the spring cannot slip about the arbor. Thus, the arbor is driven also. This means that the bias spring arbor which anchors th innermost loop of the bias spring, and the rewind gear which anchors the outermost loop of the bias spring, are now rotating in unison. The bias spring which is wound to the desired maximum level feels no further winding action even though the rewind gear continues to be driven top to the front.

With this condition existing, the only problem now is the action of the holding spring clutch. As the backspace operation continues, the bias spring arbor is rotating in the direction that causes the holding spring clutch to tighten. Not only is this tightening action present because of the wind direction of the spring clutch but also the left end of this spring clutch is anchored in the slot of the bias spring arbor in the same manner as the driving spring clutch is. Unless some means can be found to cause the holding spring clutch to expand and slip about the holding clutch arbor during this operation, damage to the bias mechanism could result. This is the function of the holding spring release arm (Fig. 5-28). Slightly after the driving spring release arm contacts the formed lug of the driving spring clutch, the holding spring release arm contacts the formed lug on the right hand end of the holding spring clutch. Continued top to the front rotation of the rewind gear then causes the holding spring release arm to drive the holding spring clutch in the expanding direction. The holding spring clutch now slips freely about the holding clutch arbor. This allows the rewind gear, bias spring, bias spring arbor, and both spring clutches to be driven in unison. The bias spring remains wound to its maximum specified level as the backspace continues.

Two spring clamps, illustrated in Figure 5-29, clamp over each one of the spring clutches in the area where the spring clutches fit over the bias spring arbor. These spring clamps serve several functions. First, they control the lateral position of the spring clutches. The driving spring clutch should be kept towards the left so that the maximum number of clutch coils will be on the driving arbor. The holding spring clutch should be positioned towards the right so that the maximum number of coils will be in contact with the holding arbor. Second, the clamps limit the amount of lateral motion of the rewind gear and bias spring cage assembly as the assembly wanders left to right on the bias spring arbor. Third, the lug on the clamp that extends across the free coils of each spring clutch aids in obtaining a more even expansion of the spring clutch coils when the clutches are released. They also de-

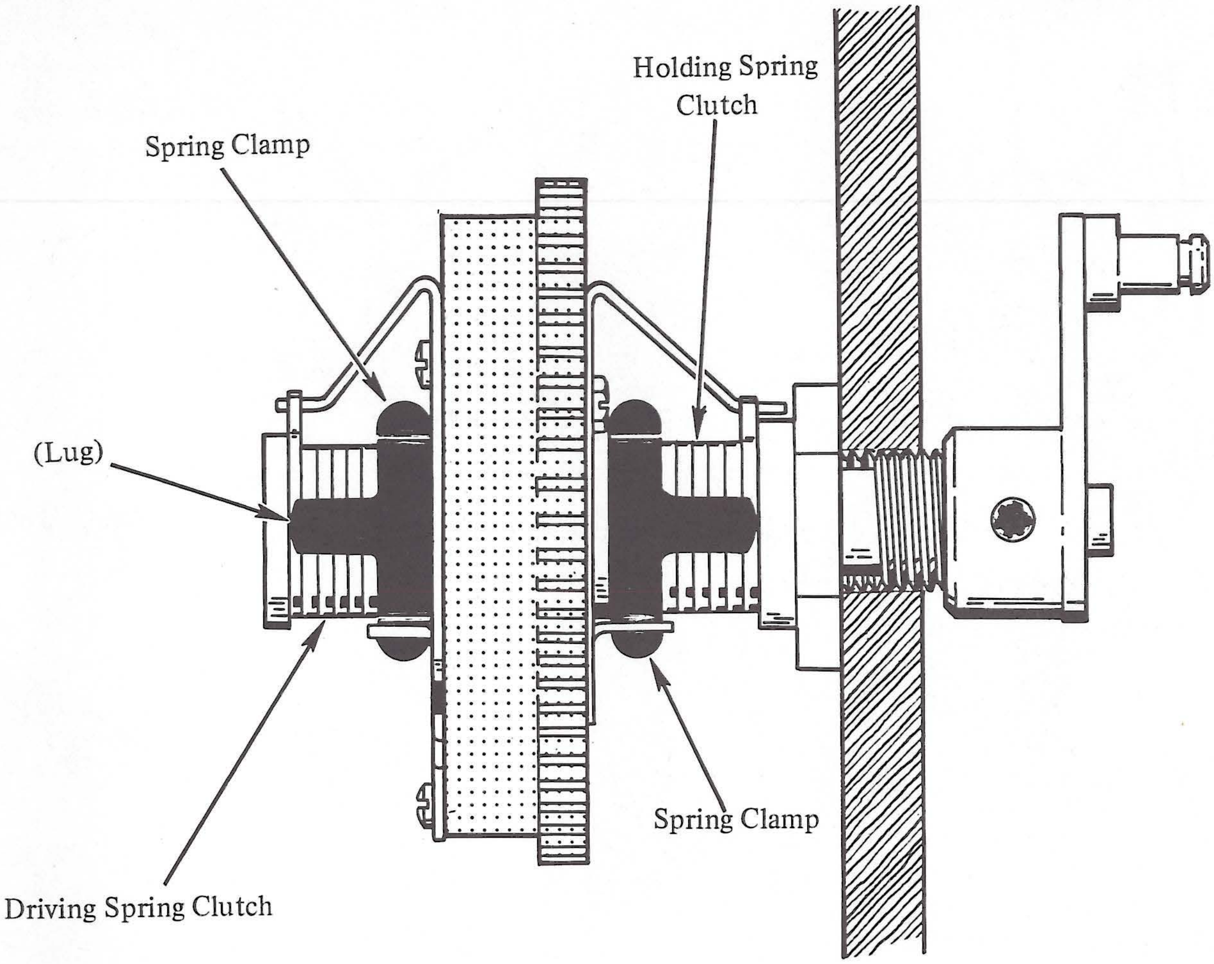


FIGURE 5-29

crease the backlash in the clutching operation by allowing only a minimum number of spring coils to be "opened" for slippage to occur.

The final function is to control the amount of unwind of the bias spring under unusual conditions. Under normal operating conditions the maximum unwind of the bias spring will be slightly less than 1/2 of a revolution. Any time the bias spring is permitted to unwind further than 1/2 of a revolution, stop lugs opposite the spring release arms come in contact with the turned-out ends of these two spring clamps. This stops the unwinding action (Fig. 5-30). Without the spring clamps the unwinding action would continue until the spring release arms strike the rear side of the formed lugs of both spring clutches. Parts damage may result if this were permitted.

The only time that an unusual amount of unwind will occur is either when the machine is being serviced or when a malfunction occurs that causes the escapement pawl and pinwheel to lose control over the lead-

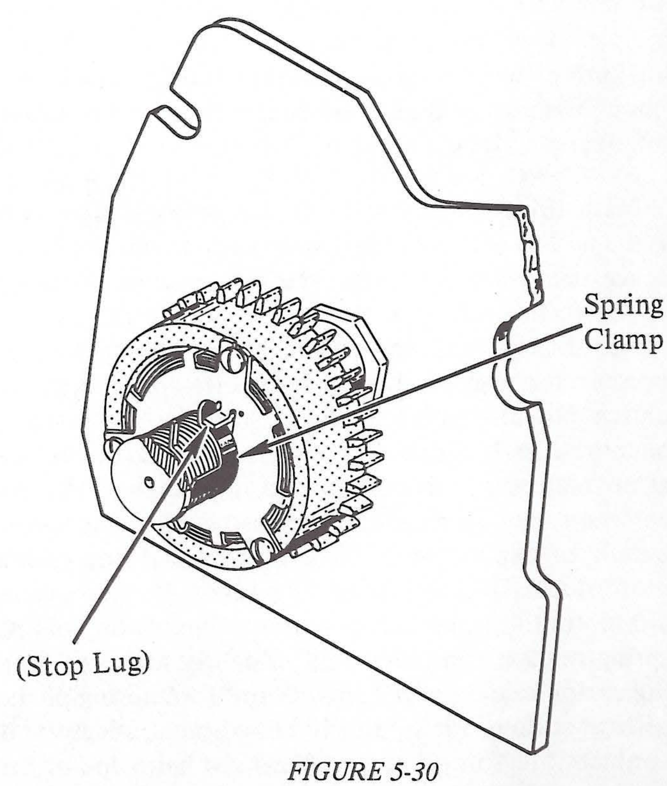


FIGURE 5-30

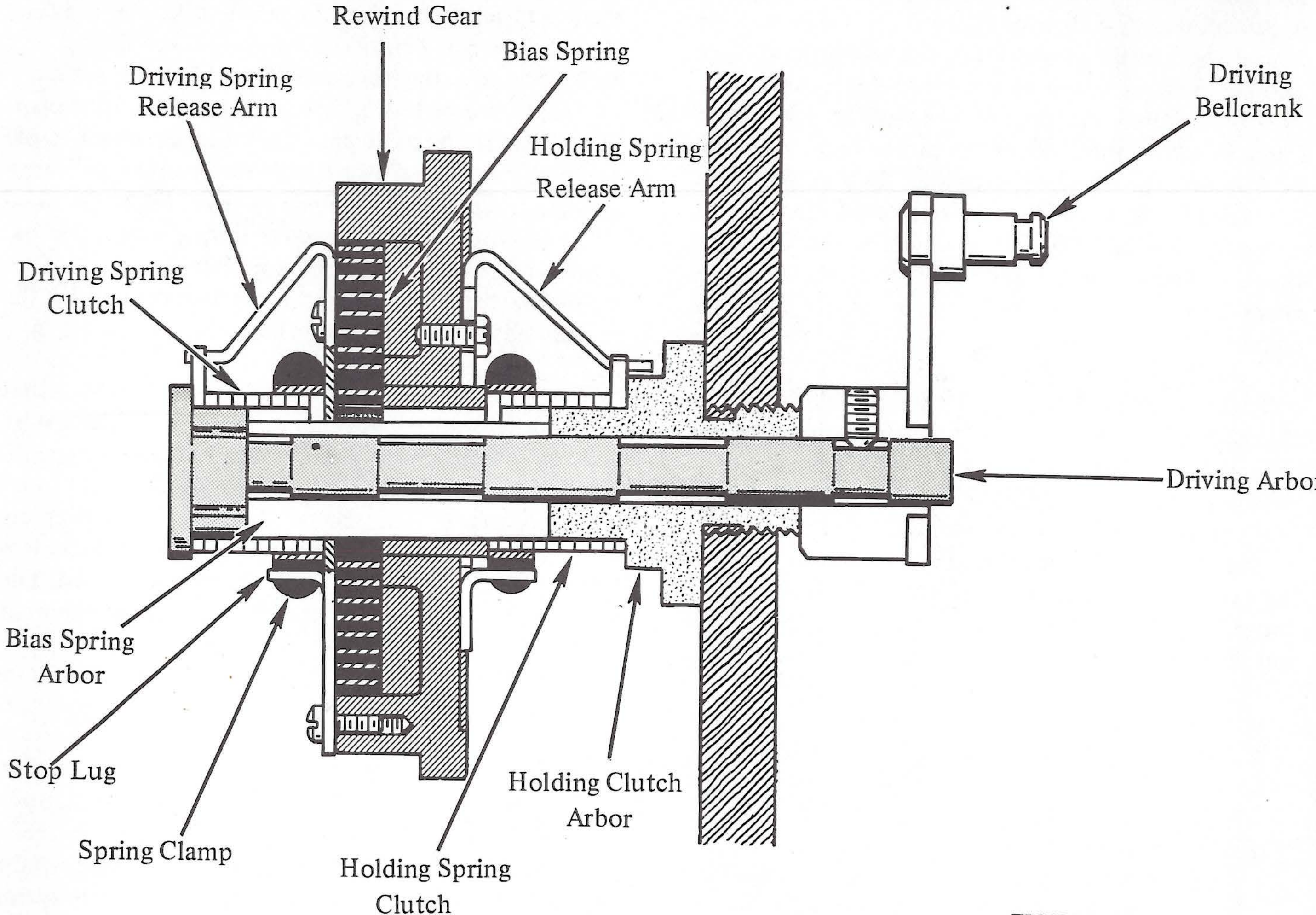


FIGURE 5-31

screw. Repetitious operation of the pitch selector lever will also cause an unusual unwind to the bias spring.

Each time the machine cycles sufficient motion is produced to the driving bellcrank to cause a minimum rewind of 90 degrees to the bias spring. Since a 9 unit escapement in the largest pitch only unwinds the bias spring 67-1/2 degrees, which is much less than the 90 degree rewind, then the bias spring will always be fully wound before the escapement pawl is tripped. This is only for a continuous printing operation. As soon as either the carrier return or tab mechanism is operated the leadscrew goes through a homing operation. The maximum rotation for the leadscrew during a homing operation is one unit shy of a full revolution or 330 degrees. Since a four to one ratio exists between the rotation of the leadscrew and the rotation of the bias spring a maximum homing operation will cause the bias spring to unwind 82-1/2 degrees. Operating a 9 unit escapement followed by a maximum homing operation will produce the greatest unwind condition on the bias spring. This will be 67-1/2 degrees plus 82-1/2 degrees for a total unwind of 150 degrees or 5/12 of a revolution. Before the next escapement operation occurs the bias spring will receive a minimum rewind of 90 degrees; therefore, under normal conditions the most the bias spring will ever be unwound when the escapement pawl is tripped is 60 degrees.

4. Rebound Governor

The function of the rebound governor is to control the rebounding of the pinwheel and leadscrew as the pinwheel is stopped by the escapement pawl. Since the escapement pins in the pinwheel are only 6 degrees apart any rebounding of the pinwheel 6 degrees or greater will permit the backspace holding pawl to drop in and hold on the wrong pin. This condition will result in a carrier escapement that is one unit short.

Rebounding of the pinwheel can play havoc with the escapement selection mechanism during a repeat cycle operation. The escapement pawl cannot be tripped until after the typehead has printed which is 46 milliseconds into the cycle. A machine cycle takes a total of 71.4 milliseconds, therefore only 25.4 milliseconds are left for the escapement operation. Since a

nine unit escapement in the large pitch requires 48 milliseconds (8 milliseconds used for overshoot, rebound, and settle down time), the escapement operation extends 22.6 milliseconds into the second cycle. This means that the chopper bar action for escapement selection must occur no earlier in a cycle than 22.6 milliseconds and no later than 46.0 milliseconds. A total allowance of 23.4 milliseconds. Because the chopper bars take 16 milliseconds for the operation this only leaves 7.4 milliseconds for adjustment tolerances and print point variations within a given machine.

Therefore, the chopper bar timing with respect to the escapement trip point and the print point are quite critical. Rebounding must be kept to a minimum if the pinwheel is to be stationary when the chopper bars begin to operate for the second cycle. If the pinwheel rebounds by more than 2 degrees when the chopper bar action has begun the pinwheel will not be in the correct position for the chopper bar operation. This will result in either:

a. Jammed chopper bars and no escapement.
b. No pins being set and random escapement.
c. Pins being set one unit off resulting in an escapement that is one unit short.
d. Momentary stopping of the pinwheel by the chopper bars permitting the escapement pawl to float forward out from beneath the trip lever. This will result in a strike-over as the escapement pawl will not be tripped for the second cycle.

The requirements of the rebound governor are to limit the pinwheel rebound to 2 degrees or less by the time the chopper bars contact the pins. If there should be a second bounce the governor should limit this bounce to 1/2 degree or less by the time a second print operation occurs. Each degree that the pinwheel is off when the typehead prints will result in .0023" horizontal misalignment in the large pitch. Since the maximum rebound tends to occur during a chopper bar action rather than at print point, the amount of rebounding that can be tolerated is determined by the requirements of the chopper bars.

The rebound governor consists of a flywheel that is mounted on the right hand end of the leadscrew by a clutch. When the leadscrew rotates in the escape direction the clutch slips permitting the flywheel to remain stationary. As soon as the rebound action occurs the leadscrew begins to rotate backwards. Rotation in this direction causes the clutch to hold. The mass of the flywheel is now felt by the escapement system. Most of the rebound energy is absorbed in accelerating the flywheel, thus the rebounding is dampened.

The clutch used in this operation is called a Torrington ® drawn cup roller clutch. This clutch, upon first impression, looks somewhat like a needle bearing. The clutch consists of a housing that contains roller bearings around its inside periphery. The action that takes place between the rollers and the housing provides the clutch effect.

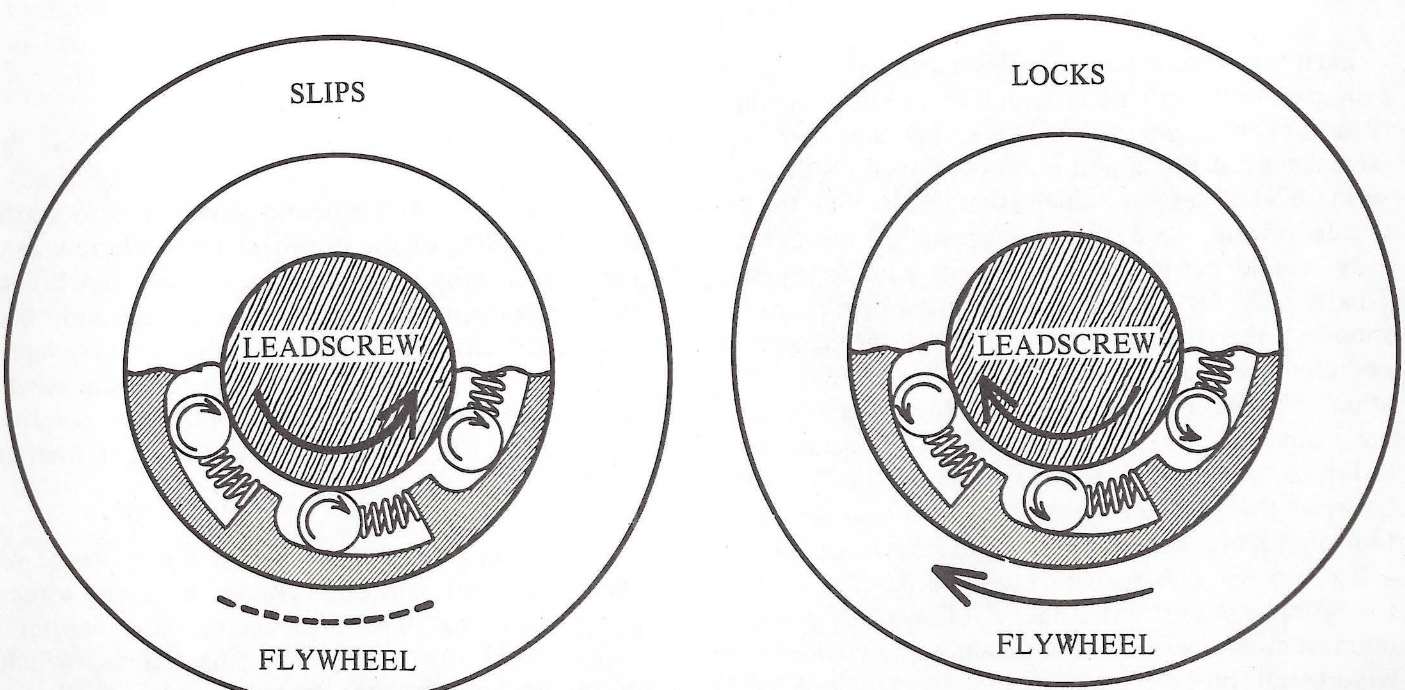


FIGURE 5-32

"A" "B"

® *Trademark of Torrington Co., Torrington, Conn.*

Notice in Figure 5-32A that the outside housing is designed with an inclined ramp to the right of each roller shown. Also note that each roller is spring loaded towards the right, up the incline, by the integral retainer spring. As long as the leadscrew turns in the counterclockwise direction (escape direction) the rollers will rotate in the clockwise direction down the inclined ramp (against the retainer springs). The friction between the leadscrew, rollers, and outer housing is at a minimum; therefore, slippage occurs. As soon as the leadscrew starts to turn in a clockwise direction the rollers begin to rotate counterclockwise up the inclined ramp (Fig. 5-32B). The friction between the leadscrew, rollers, and outer housing grows to a maximum locking the outer housing to the leadscrew. The retainer springs load the rollers up the incline to provide the initial friction and to keep backlash to a minimum.

As shown by Figure 5-33 the rebound governor assembly mounts on an arbor that is set screwed to flat spots on the right hand end of the leadscrew. Delrin ® bearings inserted into the governor assembly, on each side of the Torrington ® clutch, provide radial stability to this assembly. A C-clip on the end of the arbor retains the governor in place.

A governor brake, mounted between two flanges located on the lower stud that supports the idler gear plate, rides in a corked lined groove in the flywheel portion of the governor. The purpose of the brake is to provide a frictional drag on the flywheel which is sufficient to bring it to a stop before the rebound of the next cycle occurs. It also aids in retarding the escapement system during the rebound action.

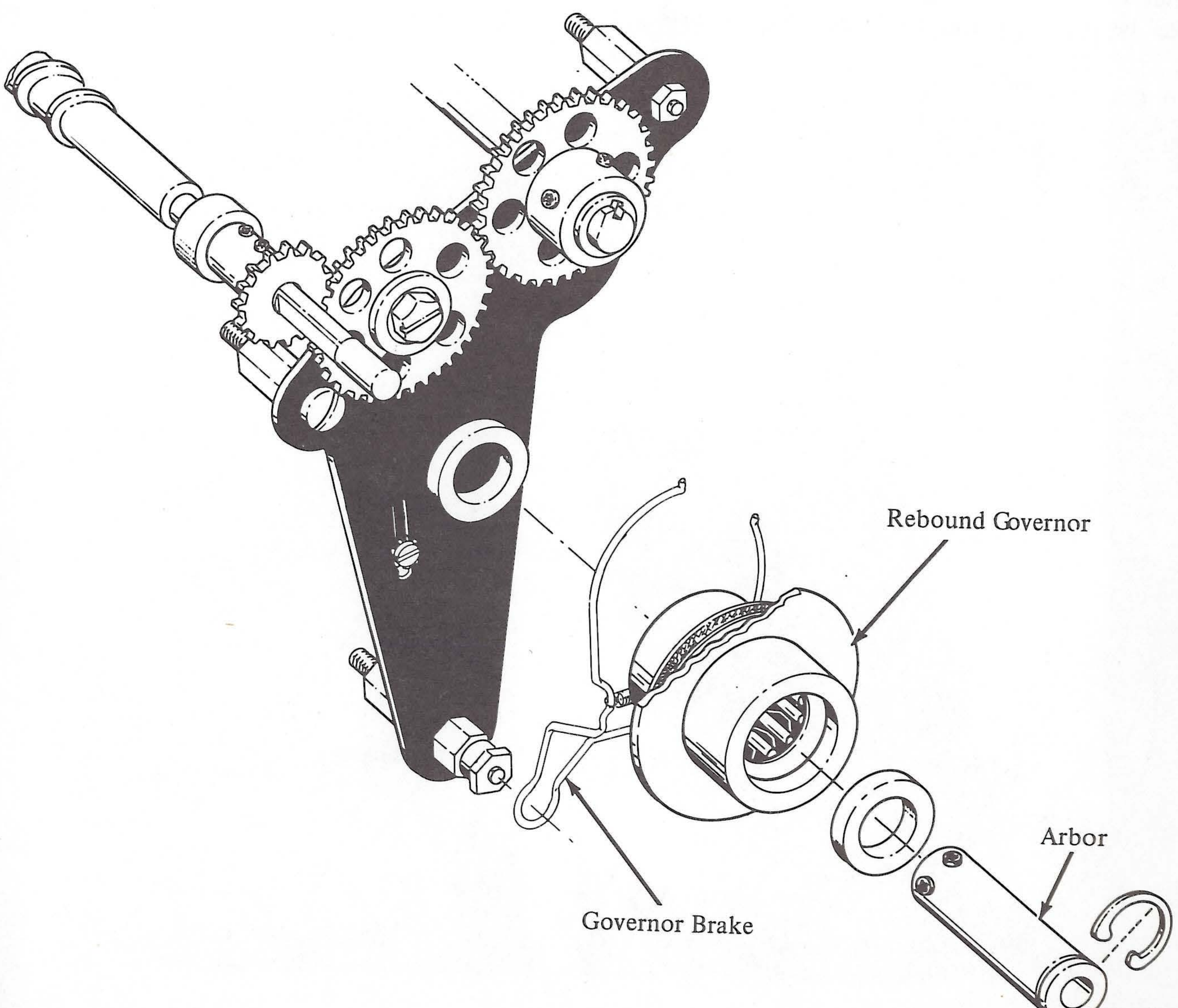


FIGURE 5-33

5. Pitch Selection Mechanism

The pitch selection mechanism increases the flexibility of the "Selectric" Composer because it permits the operator to adjust the escapement to match the type size she is using. This means that a greater variety of type styles and designs may be made available for this machine. A lever located in the upper left hand corner of the machine, similar to the multiple copy control lever on the "Selectric" Typewriter, is used to select the pitch (Fig. 5-34). The setting of the lever is obtained through color coding. Once the desired typing element has been chosen the operator merely observes the color indicated on the cap of the element and then positions the selector lever to match this color.

There are three positions for the lever. A setting of blue will produce an escapement unit value of 1/96", yellow a unit value of 1/84", and red a unit value of 1/72". Shifting the pitch selector lever changes the gear ratio between the pinwheel and the leadscrew so that three different output angles to the leadscrew can be realized per unit rotation of the pinwheel. It should be noted that the leadscrew may advance in a random fashion up to four units when the pitch is changed because of the bias spring load on the system. Therefore, the carrier will lose its position by up to 4 units following each pitch change. Because of this random advance, repeated pitch changes without cycling the machine will run down the leadscrew bias which may cause an improper escapement. Therefore, it is recommended that a burst of repeat spacebars be initiated following each pitch change. A further recommendation is that a pitch change precede rather than follow a carriage return operation.

Pitch change is accomplished through the three change gears located on the gear changer shaft (Fig. 5-35). These three change gears, which are in mesh with the three transfer gears on the pinwheel assembly, are designed such that any one of them may be selected to carry the driving action from the gear changer shaft to the pinwheel. A sliding key, which rides in a slot in the gear changer shaft, may be shifted left or right into engagement with a keyway of any of the three change gears. Once the key is engaged

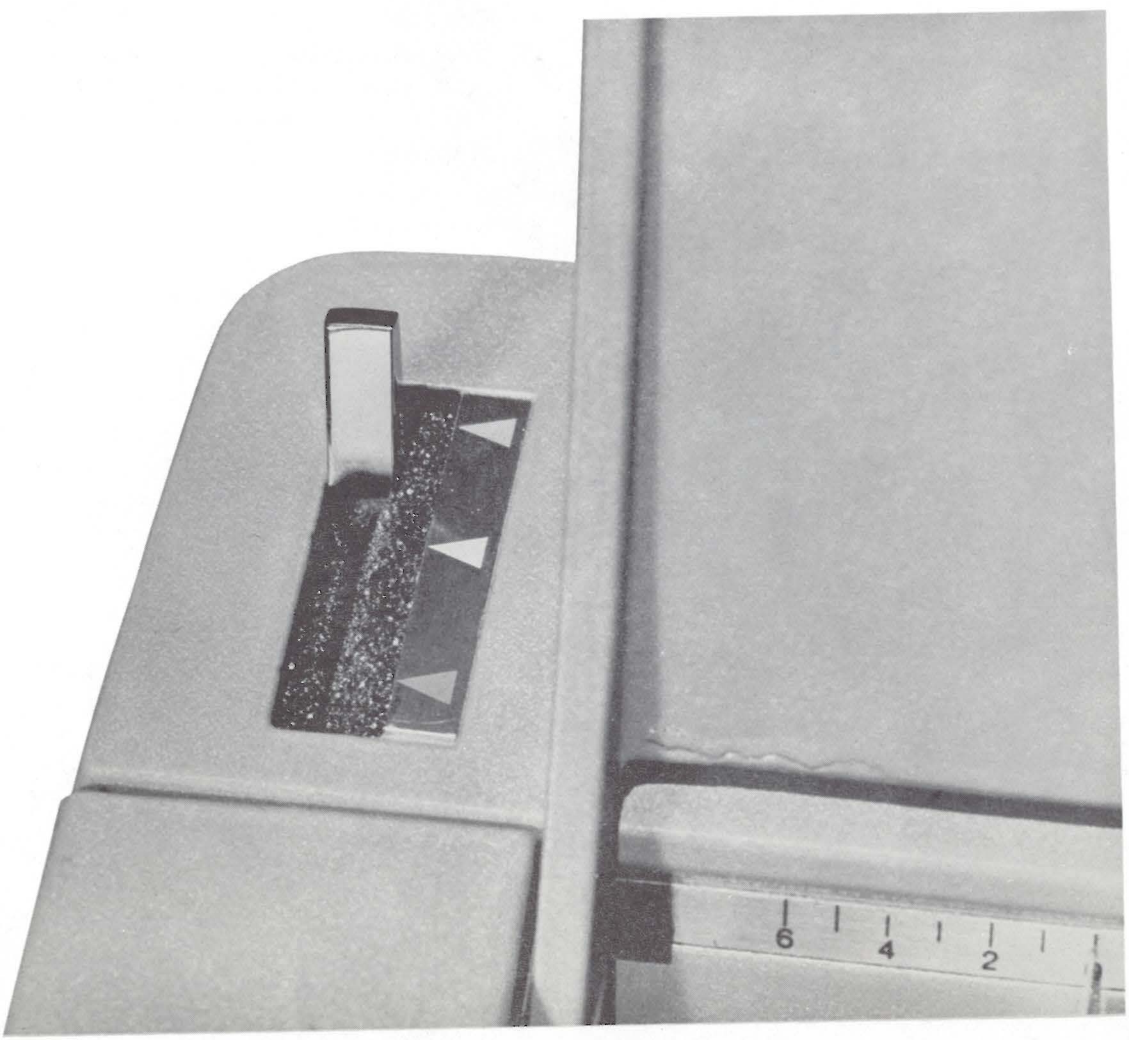


FIGURE 5-34

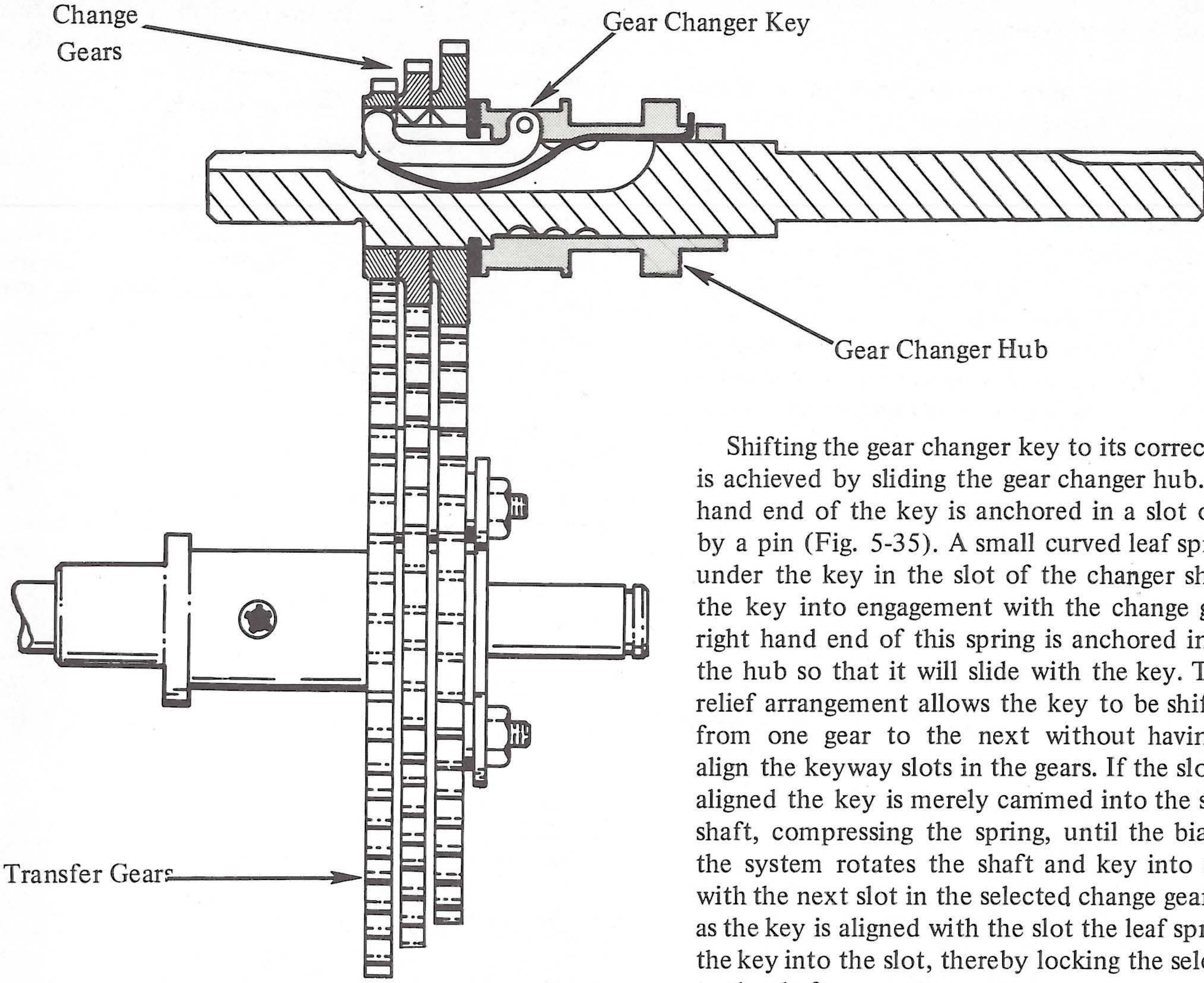


FIGURE 5-35

Shifting the gear changer key to its correct position is achieved by sliding the gear changer hub. The right hand end of the key is anchored in a slot of the hub by a pin (Fig. 5-35). A small curved leaf spring, lying under the key in the slot of the changer shaft, loads the key into engagement with the change gears. The right hand end of this spring is anchored in a slot of the hub so that it will slide with the key. This spring relief arrangement allows the key to be shifted easily from one gear to the next without having to first align the keyway slots in the gears. If the slots are not aligned the key is merely cammed into the slot of the shaft, compressing the spring, until the bias load on the system rotates the shaft and key into alignment with the next slot in the selected change gear. As soon as the key is aligned with the slot the leaf spring drives the key into the slot, thereby locking the selected gear to the shaft.

A small steel ball in a hole of the gear changer hub functions to detent the hub assembly in its selected position. The detenting action comes from the detenting ball dropping into one of the three shallow grooves encircling the grea changer shaft (Fig. 5-36). An elastic retainer is used to provide the necessary loading of this pin against the shaft. The retainer also serves to hold the gear changer key pin in place.

with one of the change gears the other two gears, although still engaged with the transfer gears, float free on the changer shaft. The driving action from the leadscrew to the pinwheel comes only through the change gear that is keyed to the gear changer shaft. The difference in pitch between the change gears produces the change in ratio between the leadscrew and pinwheel. The number of teeth on the three change gears are 30, 35, and 40 while the number of teeth on the three transfer gears are all 75.

Each change gear has several keyway slots that the change gear key may engage. The number and orientation of these slots in each change gear is designed to satisfy the requirements of the homing operation. The homing operation, which occurs when a carrier return or tab operation is initiated, is the process of returning the leadscrew to one specific rotational position. The home position of the leadscrew must be the same for all three pitches. How this is accomplished will be explained in the carrier return section.

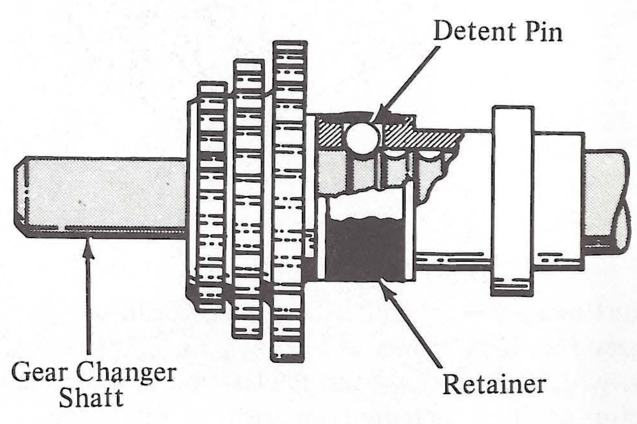


FIGURE 5-36

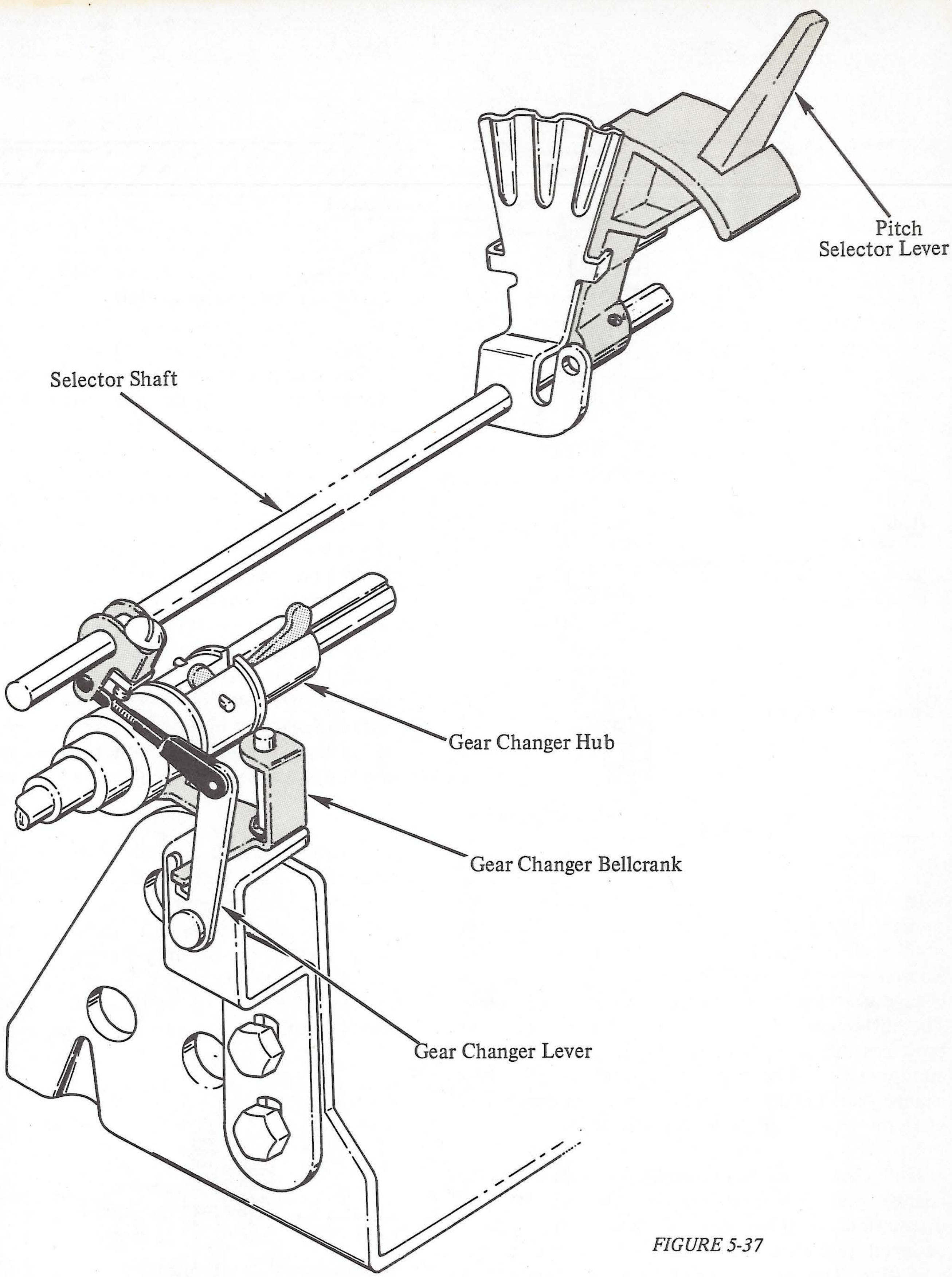


FIGURE 5-37

The linkage from the pitch selector lever to the gear changer hub is as shown in Figure 5-37. The selector lever, which is set screwed to the left end of the pitch selector shaft, is detented in position by a detent plate mounted on the left hand carriage plate. Moving the selector lever rotates the selector shaft which produces motion to the gear changer lever via a bellcrank and link. The gear changer lever then rotates the gear changer bellcrank which slides the gear changer hub into its selected position.

SHIFT

Except for the escapement code bails and the medium velocity code bail being shift sensitive (explained in the Print and Escapement sections) and a slight difference in the interlock bail assembly, the shift mechanism on the "Selectric" Composer is identical to the shift mechanism on the standard "Selectric" Typewriter.

On the "Selectric" Composer the interlock bail functions not only in a shift to print interlocking operation but also in several other interlocking operations. It is used in the carrier return to print interlock, print to carrier return interlock, print to backspace interlock, and backspace to print interlock. An explanation of how these interlocks function can be found within their respective mechanisms.

Because the interlock bail is used for these other interlocking operations it is designed so that it can be rotated into its print interlocking position while the shift mechanism remains at rest. Also, because of these other requirements the spring relief action needed between the shift detent arm and the cycle clutch interlock pawl is now produced at the right end of the interlock bail next to the shift detent arm rather than at the left end next to the cycle clutch interlock pawl.

The shift detent arm via the shift interlock bail transfer arm and the shift interlock bail bellcrank actuates the interlock bail (Fig. 6-1). The shift interlock bail bellcrank is fastened to the bail by a binding screw. It straddles the shift interlock bail transfer arm which mounts freely on the bail. A heavy extension spring anchored between the bellcrank and the transfer arm loads the transfer arm against the bellcrank. This causes the transfer arm, bellcrank, and interlock bail to tend to operate as one unit. The forward extension of the transfer arm is loaded down against the top of the shift detent arm by a light extension spring anchored between the transfer arm and the detent arm.

This arrangement allows the interlock bail to be rotated by the shift detent arm or independent of the shift detent arm. Also, the heavy spring between the transfer arm and the bellcrank permits the rotation of the interlock bail to be restricted without causing a choking off action back to the detent arm. The motion produced to the transfer arm is merely absorbed by extending this spring.

The shift interlock mechanism on the "Selectric" Composer, which is built on a Model 725 powerframe, is a Model 721 shift interlock mechanism. It operates exactly the same as on a 721 "Selectric" Typewriter.

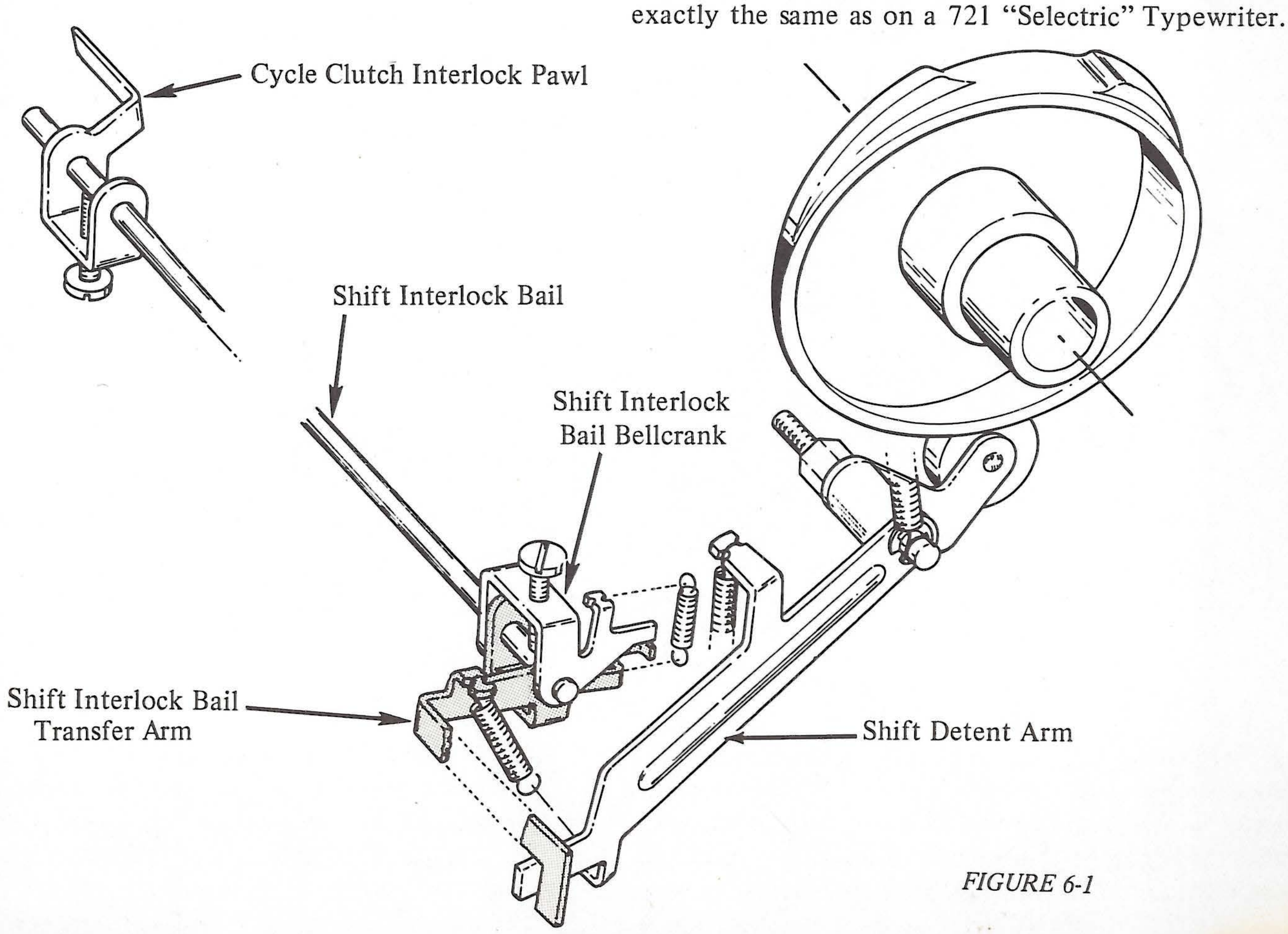


FIGURE 6-1

CARRIER RETURN

The carrier return mechanism on the "Selectric" Composer" is similar to that of the "Selectric" Typewriter. Except for splitting the operational bracket into two brackets, to make room for the chopper block assembly, and the addition of a homing mechanism to orient the leadscrew, the mechanism is much the same.

From Figure 7-1 you can see that the carrier return keylever is extended to the right by a shaft to the carrier return crossover keylever, so that the keylever pawl is aligned with the carrier return interposer. The purpose of the spring on the crossover keylever is to bias out excessive motion in the keylever assembly. The carrier return and index interposers mount in their own operational bracket which is located to the right of the chopper block assembly. Depressing the keylever releases the interposer so that it may slide to the rear to position the carrier return operational latch under the follower and release the carrier return/index cam. As the cam rotates the cam follower pulls the carrier return operational latch and arm down with it. This action is the same as in the base machine.

As the carrier return arm moves down the adjusting screw, on the outside of the arm, forces the carrier return latch actuating arm and pivot pin to rotate with it. On the "Selectric" Typewriter this rotational motion of the latch actuating arm and pivot pin accomplishes the following: it rotates the escapement torque bar to release the pawls from their racks, it engages the clutch through the clutch actuating arm fastened to the left hand end of the pivot pin, and it drives the carrier return latch under the keeper to hold the system actuated so that the clutch will stay engaged until the carrier reaches the left hand margin. On the "Selectric" Composer the action of the latch actuating arm and pivot pin is exactly the same except that there is no pawl release operation. The leadscrew shoe is dragged across the threads of the leadscrew during a carrier return operation. Therefore, the vertical arm on the latch actuating arm, that extends up in front of the escapement torque bar on the base machine, has been omitted.

Notice in Figure 7-1 that there is a sheathed cable fastened to the carrier return latch. This cable picks up motion from the latch to actuate the justification tube homing mechanism. Its operation is explained under the justification section. Other than for the leadscrew homing operation and the interlocks, all other areas such as cords, torque limiter, clutch unlatching, etc. function the same as on the base machine. In view of this, all that will be covered in this section is the leadscrew homing and the interlock mechanism.

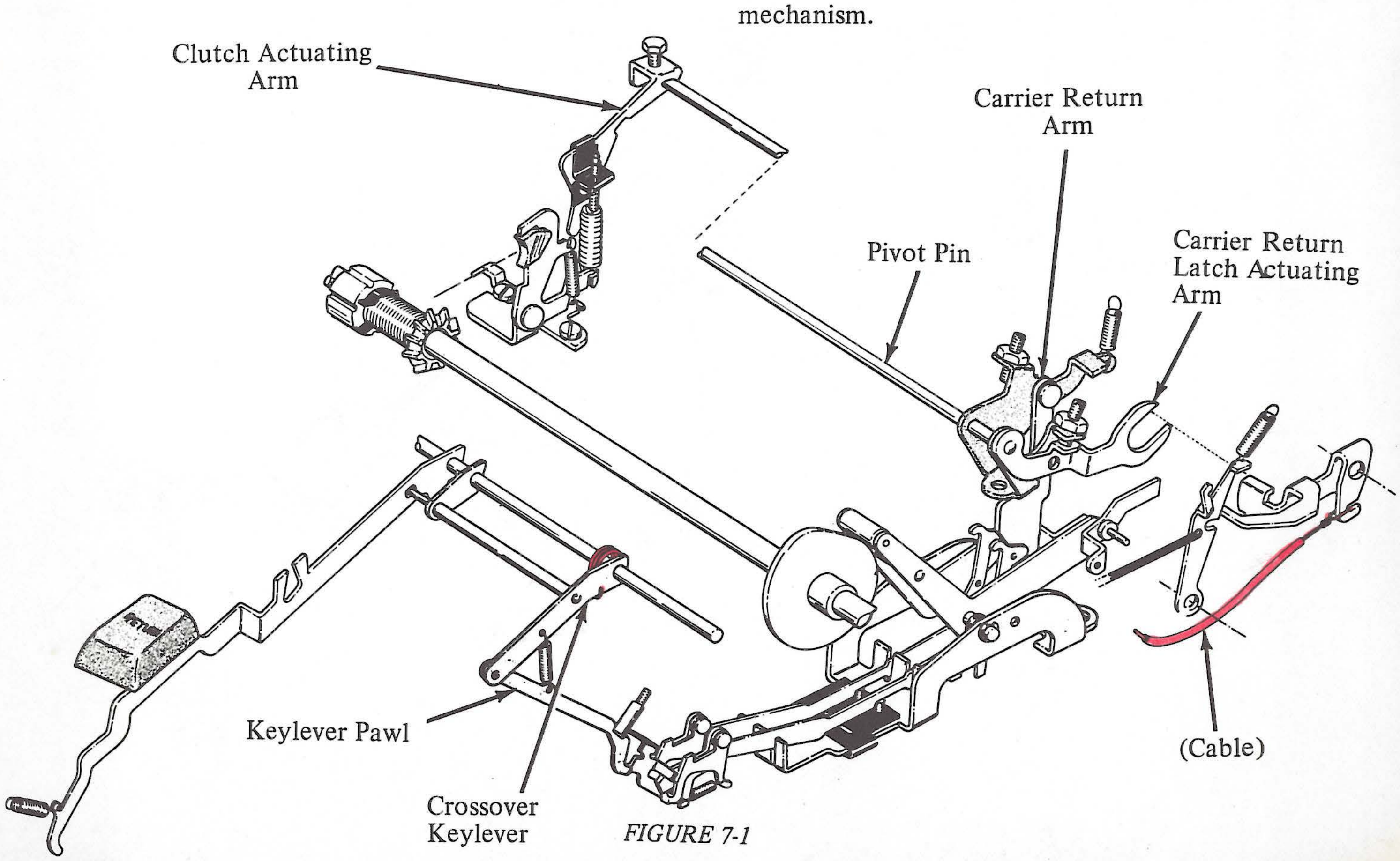


FIGURE 7-1

1. Leadscrew Homing

On the "Selectric" Typewriter the carrier return mechanism always brings the carrier back to the exact same position with respect to the setting of the left hand margin, regardless of where the margin may be set. This is because the pitch of the margin rack matches the pitch of the escapement rack. If on the "Selectric" Composer, during a carrier return operation, the pitch of the leadscrew were made to match the pitch of the left hand margin rack regardless of where the left hand margin were set or what escapement pitch the escapement mechanism were in, then the carrier would be returned to the exact same position on the writing line after each carrier return operation.

This is exactly the function of the homing mechanism. The threads on the leadscrew and the teeth on the left hand margin rack are both cut in 1/6 inch increments. By rotating the leadscrew to the rotational position that aligns the threads on the leadscrew to the teeth, on the left hand margin rack the machine effectively becomes a six pitch machine. The carrier can then only come to rest every 1/6 inch. Likewise in the tab mechanism; homing the leadscrew threads to the tab stops on the tab rack. The tab stops are all spaced 1/6 inch or 1 pica apart.

When a homing operation is called for, the entire system from the leadscrew through to the pinwheel is allowed to advance under the torque of the leadscrew bias mechanism. The system advances until the leadscrew reaches the home position. If the leadscrew happens to be at the home position when a homing operation is called for, the leadscrew remains there and the homing action is cancelled. The maximum rotation of the leadscrew during a homing operation occurs when the leadscrew is resting one unit past the home position. To reach the home position the leadscrew must advance almost a full revolution (337-1/2 degrees in the 1/96 pitch).

In brief, the homing operation is achieved through a homing stop which mounts on and rotates with the gear changer shaft. A homing pawl, which is secured to

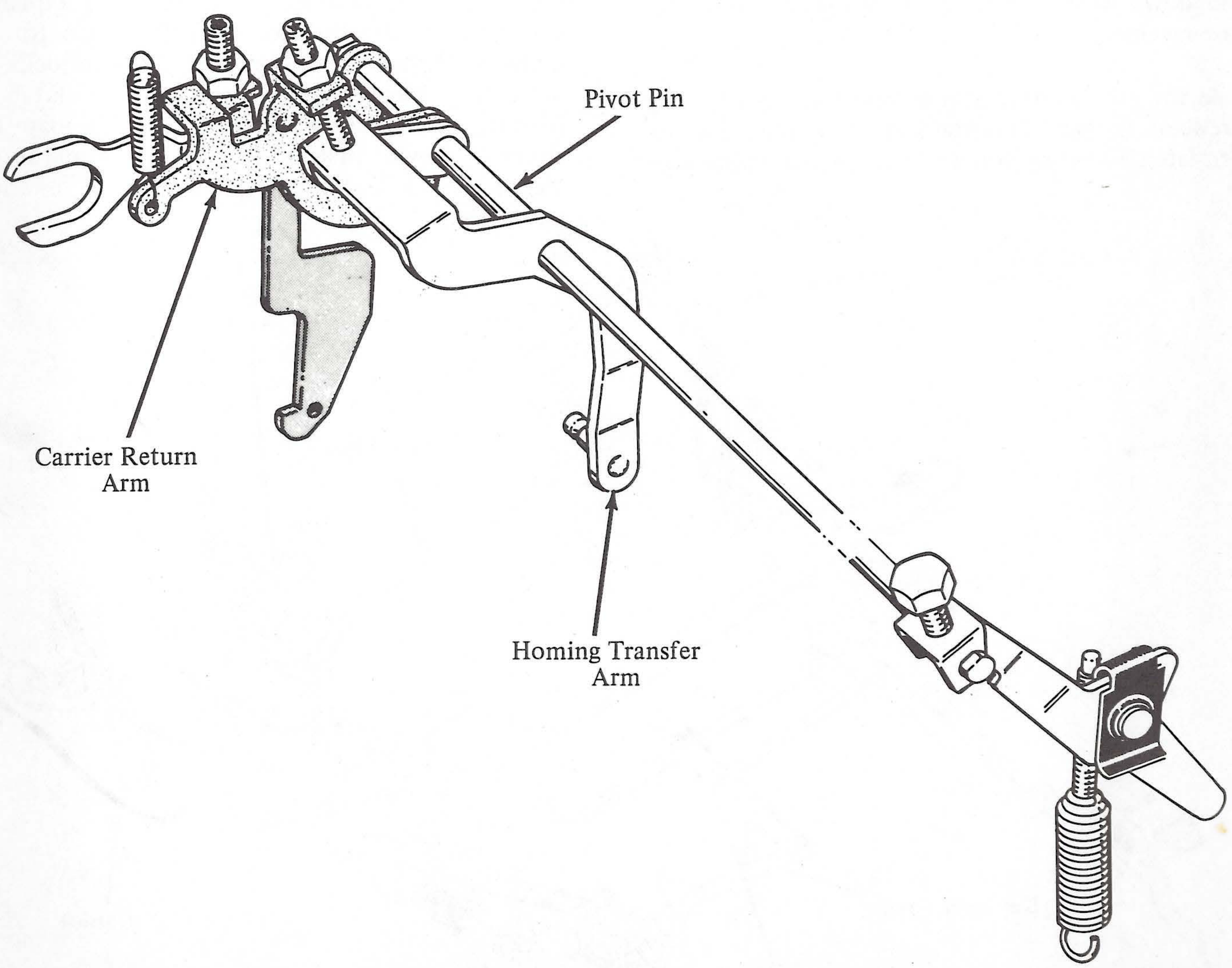


FIGURE 7-2

the pinwheel bracket, rests just clear of the rotational path of the homing stop during a normal escapement operation. When a homing operation is required, the homing pawl is moved into the rotational path of the homing stop and then the escapement and backspace holding pawls are disengaged from the pinwheel. The entire system advances freely until the homing stop is stopped by the homing pawl. At this point, the homing pawl is disengaged from the homing stop and the escapement and backspace holding pawls, which have re-entered the pinwheel, bring the pinwheel to a halt in the exact home position. This home position is where the threads on the leadscrew align with the teeth on the margin rack.

The motion to actuate the homing mechanism is taken from the carrier return arm. From Figure 7-2 you can see that as the carrier return operational latch is pulled down, the inside adjusting screw on the carrier return arm drives the homing transfer arm counterclockwise about the pivot pin. When this happens the stud on the lower leg of the transfer arm produces a pull on the homing transfer spring. This pull causes the homing actuating arm to pivot counterclockwise about the pivot pin (Fig. 7-3).

The purpose of the homing transfer spring is to provide a spring relief action within the homing mechanism. A spring relief is only needed when a homing operation is initiated while the leadscrew is at the home position. When the leadscrew is at home the homing actuating arm is restricted from rotating because the homing pawl is directly over the homing stop. The homing transfer spring absorbs the motion of the homing transfer arm so that a choking off action will not occur back to the operational cam.

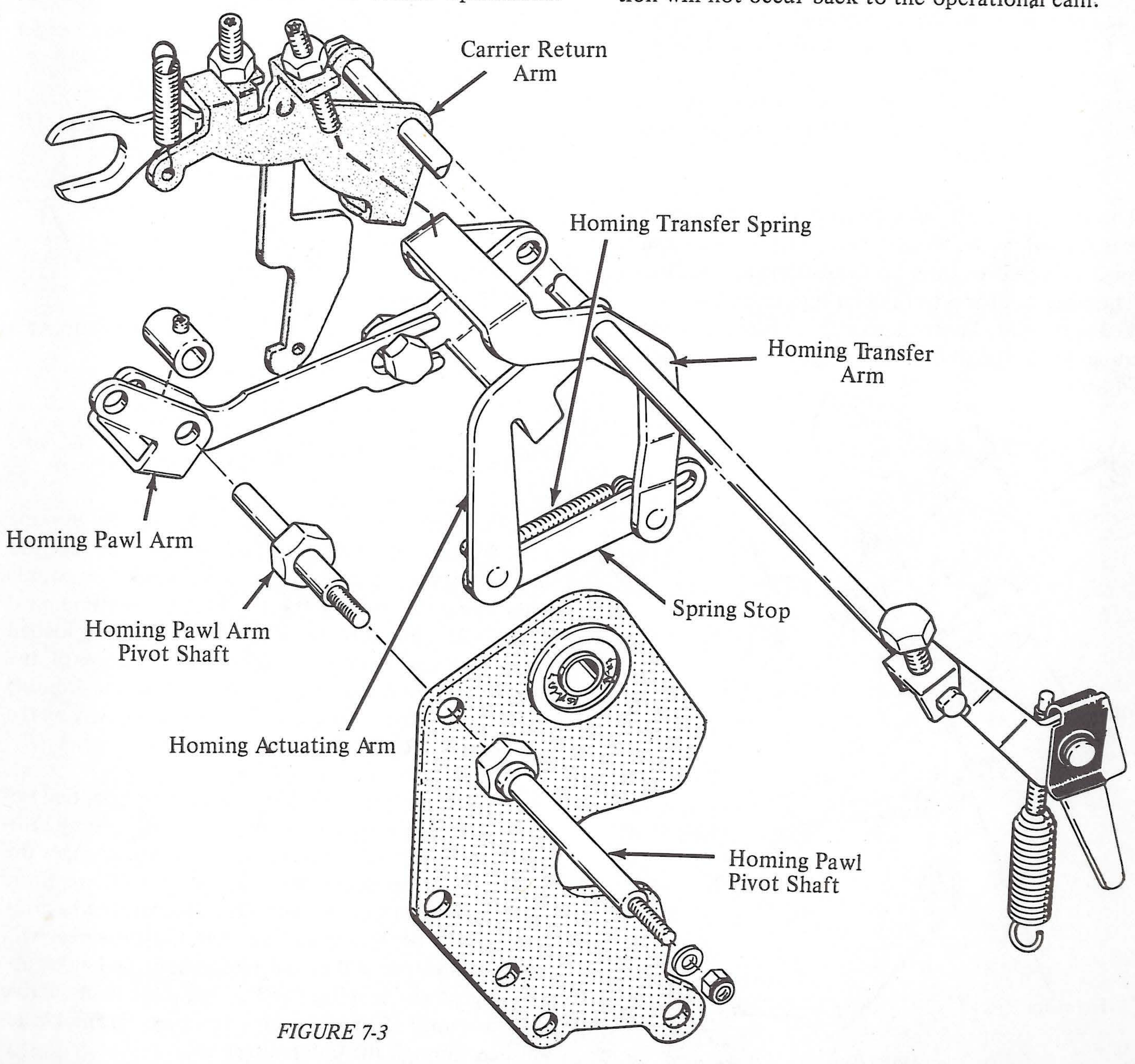


FIGURE 7-3

The spring stop fastened between the transfer arm and actuating arm maintains a load on the spring so that the spring will not stretch during a normal homing operation. The spring simply functions as a link during a normal homing operation.

The counterclockwise motion of the homing actuating arm is transmitted to the homing pawl arm by a shouldered screw that mounts in the elongated slot of the actuating arm. This motion causes the homing pawl arm to rotate clockwise about its pivot stud (Fig. 7-3). Note that this pivot stud is shouldered where it fits into the center support and that the right end is threaded into the left end of the homing pawl pivot shaft. The homing pawl pivot shaft mounts between the center support and the right side of the pinwheel mounting bracket.

The clockwise rotation of the homing pawl arm is used to pivot the homing pawl into the path of the homing stop and to remove the escapement and backspace holding pawls from the pinwheel. Let's begin by first describing the operation of the homing pawl and the homing pawl stop.

The homing pawl mounts and pivots about the homing pawl pivot shaft (Fig. 7-4). An extension spring, anchored to a pin on the center support, loads the homing pawl top to the rear into its rest position. A hexagon stud, fastened to the homing pawl by a binding screw, links the homing pawl to the homing pawl arm.

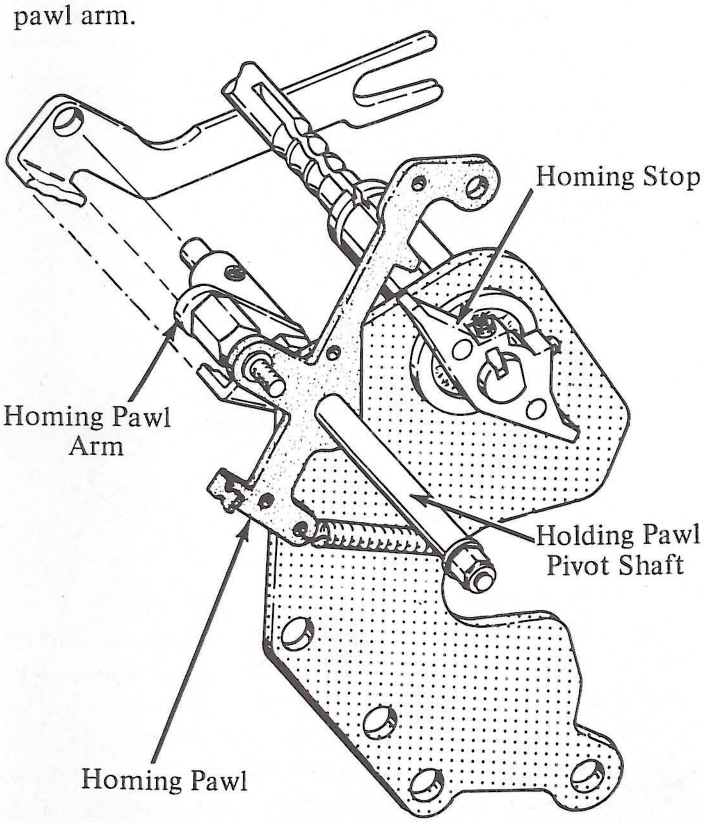


FIGURE 7-4

When the pawl arm pivots top to the front it rotates the homing pawl top to the front about its pivot shaft causing the tooth on the pawl to move into the path of the homing stop (Figure 7-5A). The homing stop is mounted on the end of the gear changer shaft directly in line with the homing pawl. It is secured to the shaft by a key and two bristo screws. One screw tightens against a flat spot on the shaft. Two arms, 180 degrees apart, on the homing stop are needed because of the two to one ratio that exists between the leadscrew and the gear changer shaft. During a homing operation the homing pawl may stop either arm, thereby making the maximum rotation of the leadscrew always less than one revolution.

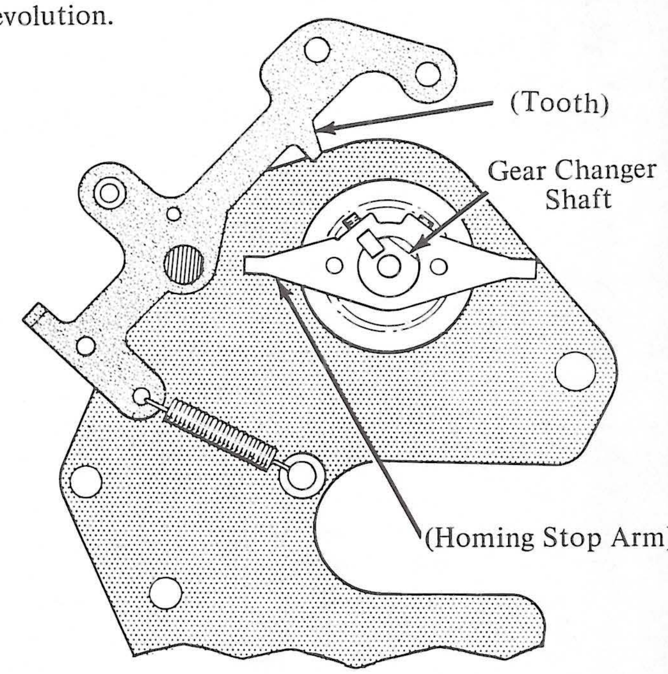


FIGURE 7-5A

A rebound check lever, mounted to the homing pawl by an eccentric screw, functions to trap the arm of the homing stop as the arm rebounds backwards after being stopped by the tooth of the homing pawl (Fig. 7-5B). The rebound check lever is spring loaded into its engaged position. The bottom edge of the lever is contoured to permit the arm of the homing stop to cam the lever clockwise out of the way as the arm approaches the tooth on the homing pawl.

When the homing pawl is rotated into its active position it must be held there until it is engaged by either arm of the homing stop. Once the arm engages the tooth on the homing pawl and is trapped between the homing pawl and the rebound check lever, the homing pawl must be disengaged so that the pinwheel will come to rest on either the escapement or backspace holding pawl. Keeping the homing pawl in its active position until the homing stop has been trapped is acplished through the unlatching pawl.

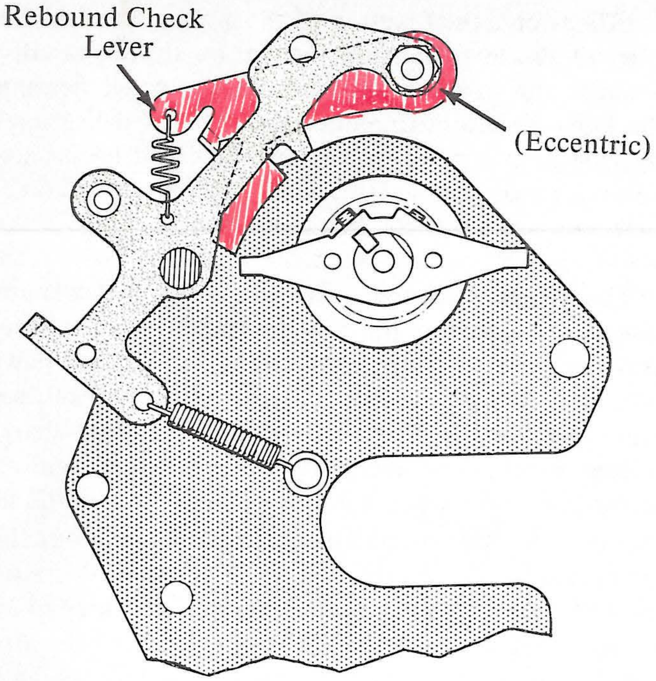


FIGURE 7-5B

The unlatching pawl mounts on the homing pawl by two shouldered rivets. The mounting holes in the unlatching pawl are elongated so that the pawl may slide left or right (Fig. 7-5C). An extension spring fastened between the unlatching pawl and the homing pawl loads the unlatching pawl towards the rear. When the homing pawl is at rest the unlatching pawl is held to the front by the homing pawl latch which mounts on the center support of the pinwheel mounting bracket. When the homing pawl is actuated,

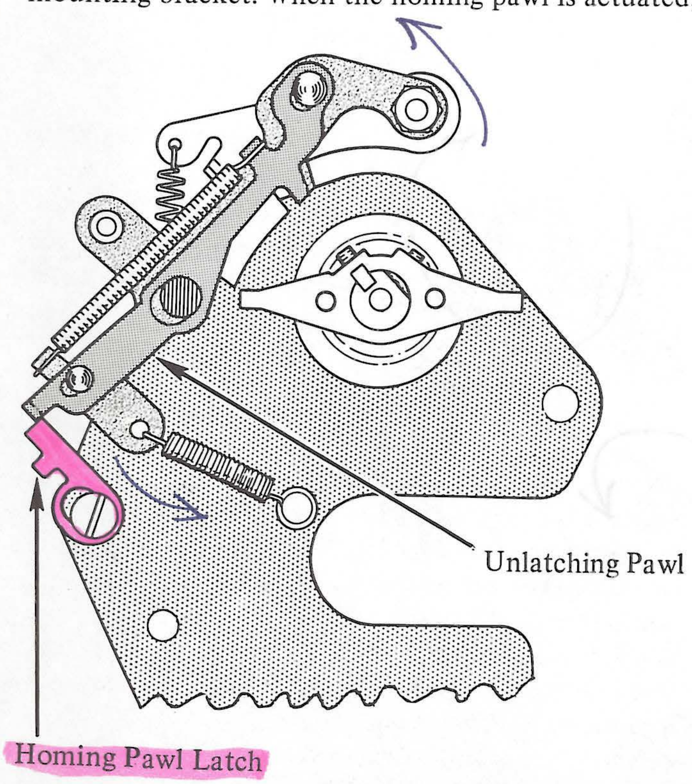


FIGURE 7-5C

the unlatching pawl slides to the rear latching the homing pawl assembly in its active position (Fig. 7-5C).

Notice that with the homing pawl latched, the tooth on the unlatching pawl is now in the path of the homing stop slightly ahead of the tooth on the homing pawl. As the homing stop rotates top to the front towards its home position it contacts the tooth on the unlatching pawl first, driving it in the unlatching direction As the unlatching pawl clears the homing pawl latch, the rebound check lever drops in behind the arm of the homing stop as shown Figure 7-5D. Even though at this point the homing pawl is unlatched, because of the mass involved the homing pawl remains in its active position long enough to dampen the rebounding of the homing stop. The escapement and backspace holding pawls will almost fully re-enter the pinwheel by the time the tooth on the homing pawl clears the homing stop. Once the homing pawl releases the homing stop the bias torque on the escapement system causes the pinwheel to advance slightly until it comes to rest on either the escapement or backspace holding pawl.

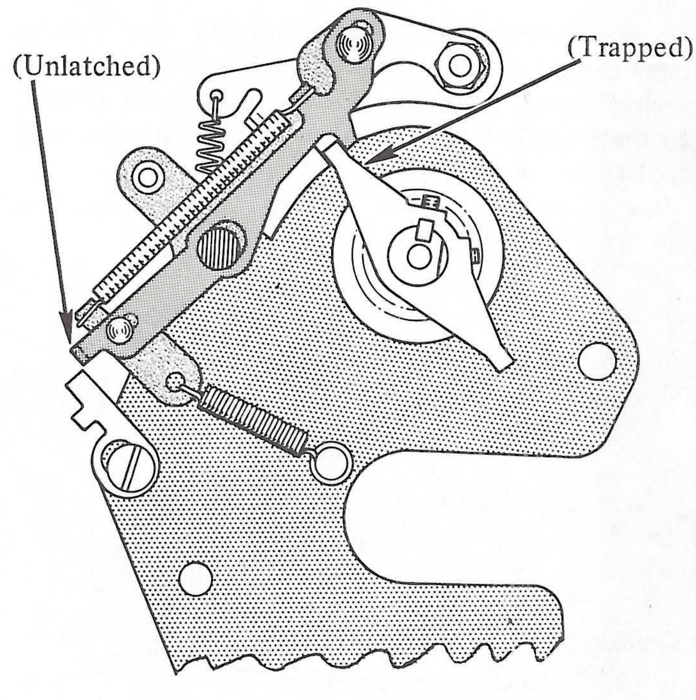


FIGURE 7-5D

Figure 7-5E illustrates the mechanism at the end of the homing operation. Notice that the homing stop has advanced slightly beneath the tooth on the homing pawl. This slight advance is the result of the escapement and backspace pawl re-entry clearance. It is this condition that produces the cancellation of a homing operation if the leadscrew is already at home

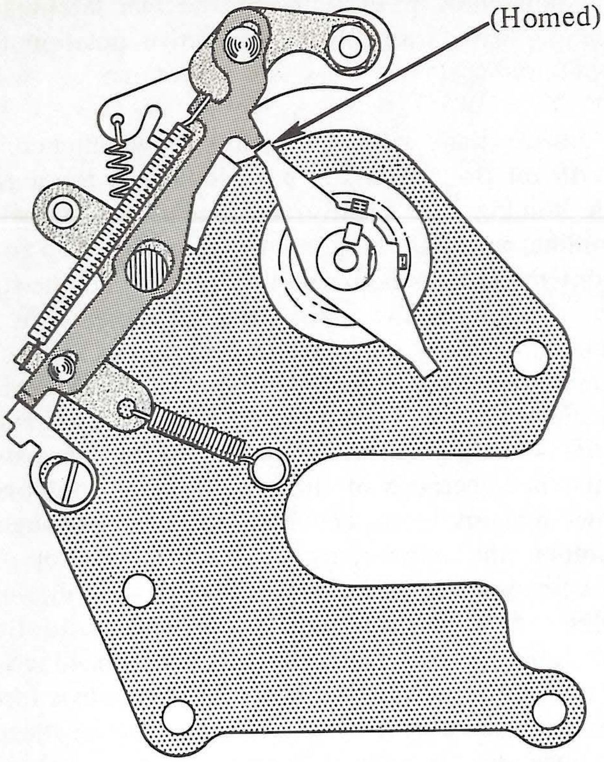


FIGURE 7-5E

when a homing operation is initiated. The homing pawl cannot rotate into its active position, therefore, a choking-off action is felt back through the linkage to the homing transfer spring. The motion produced is absorbed by this spring.

Effectively; the function of the homing mechanism is to allow the escapement system to advance rapidly towards the home position and then, when nearing the home position, to reduce the speed of the escapement system so that the escapement and backspace holding pawls can safely and accurately stop the escapement system at the home position.

The escapement and backspace holding pawls are disengaged from the pinwheel during a homing operation by the same motion that pivots the homing pawl into the path of the homing stop. The pawl release arm, which mounts on the homing pawl pivot shaft, is tied to the homing pawl by a stud and binding screw (Fig. 7-6). When a homing operation is initiated the pawl release arm pivots top to the front about the pivot shaft. A shouldered screw, mounted in an elongated hole of the pawl release lever, rides in an elongated hole of the pawl release arm. When the arm pivots top to the front it causes the lever, which mounts on the escapement pawl mounting pin, to pivot counterclockwise lifting both pawls out of engagement with the pinwheel. The pawls remain disengaged for as long as the homing pawl is held in its latched position.

Correct homing is achieved regardless of where the pitch selector lever may be set or what keyway slot the gear changer key may be engaged in. This is because the keyway slots in each change gear are symmetrically located with respect to the escapement

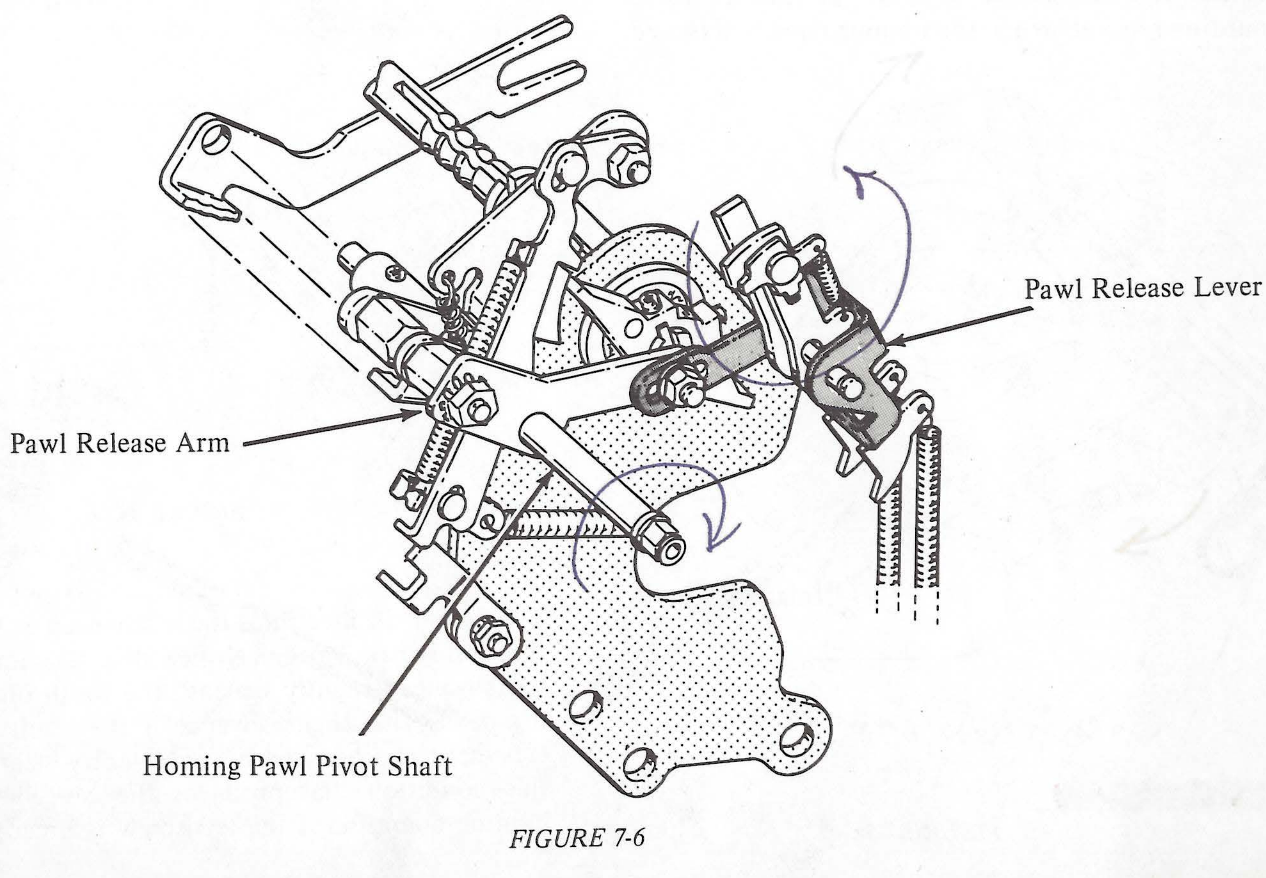


FIGURE 7-6

pins of the pinwheel. The change gears, when assembled, are meshed with the transfer gears so that their keyway slots are oriented to the escapement pins in the pinwheel. If the relationship between the change gears and the transfer gears is lost during disassembly, the proper orientation must be regained before the homing mechanism can be expected to perform accurately. How to properly position the change gears during assembly is explained in the Adjustment Theory Manual.

2. Print to Carrier Return Interlock

The carrier return mechanism is interlocked during a print cycle because of a possible interference between escapement selection and leadscrew homing. If a carrier return operation were permitted to be initiated during a print cycle, the chopper bars could scissor into the pinwheel to perform their escapement selection operation while the pinwheel is advancing rapidly in a homing operation. Damage to the chopper bar assembly could result.

Interlocking the carrier return mechanism is accomplished through the interlock bail. This bail is located in the same area as the character interrupter bail on the "Selectric" Typewriter. It pivots at the left on an anchor plate located on the cycle clutch control bracket, and at the right on the interlock mounting plate which is mounted on the right hand side of the machine powerframe. Collars set-screwed on each end of the bail serve to control the lateral position of the bail (Fig. 7-7).

Mounted on the right end of the interlock bail is the carrier return interlock bellcrank. This bellcrank, which is secured to the bail by a binding screw, is positioned directly below the carrier return keylever pawl. A formed lug on the bellcrank rests beneath the lower extension of the carrier return keylever pawl (Fig. 7-7). When the carrier return keylever is depressed, the keylever pawl must drive the bellcrank and interlock bail top to the rear before it can release the carrier return interposer. The interlocking of the carrier return during a print cycle is achieved through this interlock bellcrank.

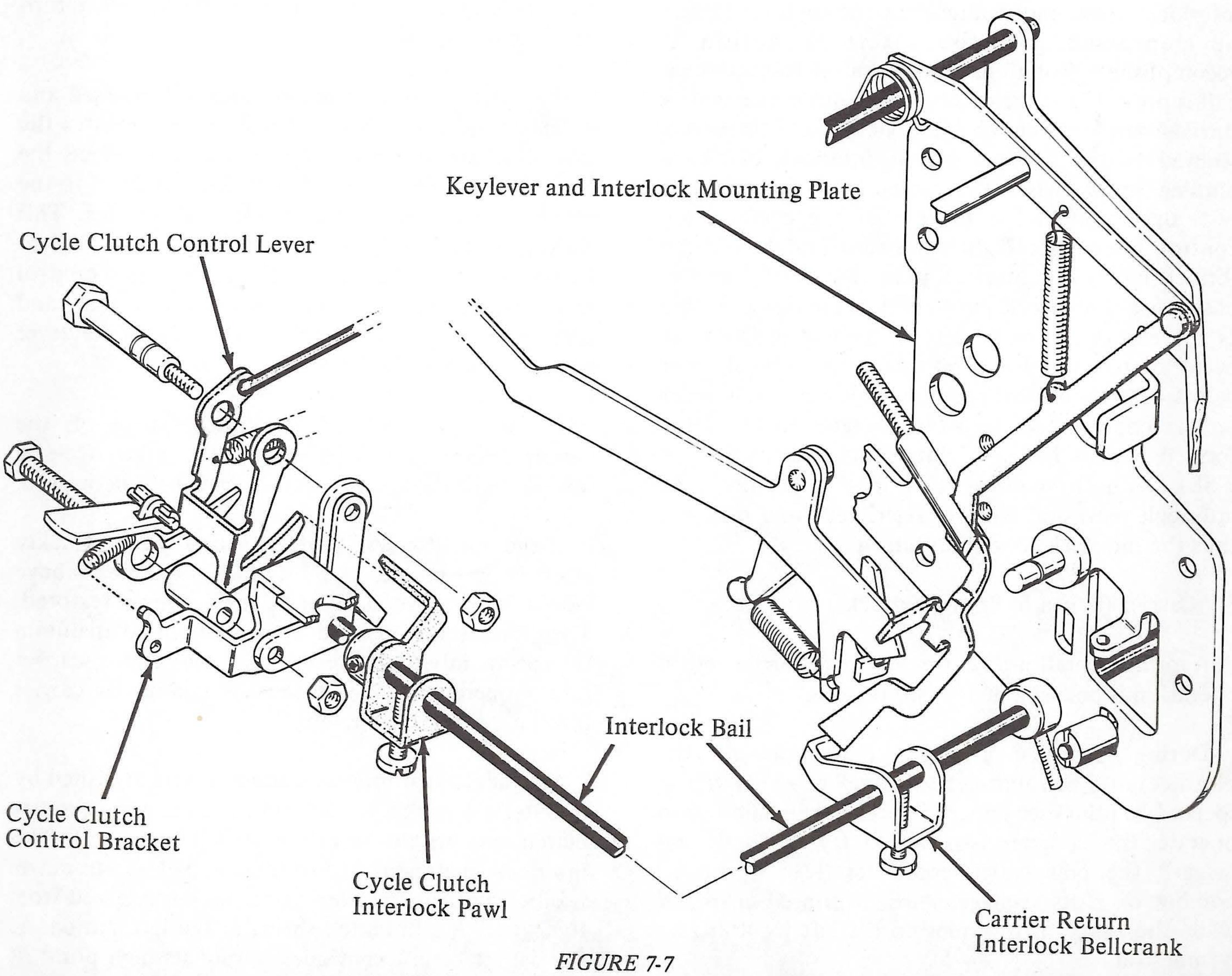


FIGURE 7-7

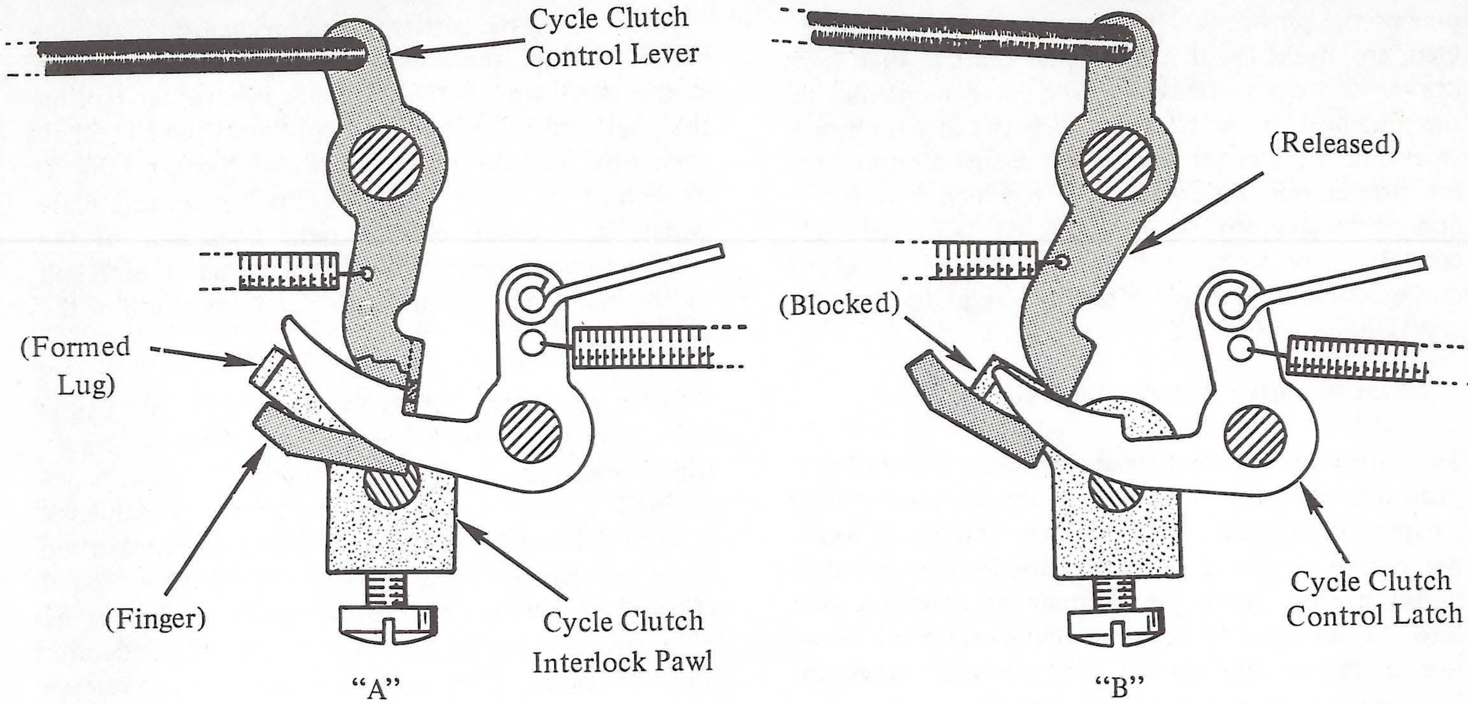


FIGURE 7-8

When the cycle clutch has been released the interlock bail is restricted from rotating. If the interlock bail cannot rotate then the keylever cannot be depressed and the interlock action is accomplished. Rotational restriction of the interlock bail is produced at the cycle clutch release mechanism through the cycle clutch interlock pawl. This pawl is secured to the left end of the interlock bail by a binding screw. When the cycle clutch is latched at rest, the finger at the bottom of the cycle clutch control lever rests slightly forward and below the formed lug of the interlock pawl (Fig. 7-8A). In this position the interlock pawl and bail are free to rotate as the carrier return keylever is depressed. Once the cycle clutch has been released, the control lever pivots into its released position. This places the finger on the control lever into the operating path of the formed lug of the cycle clutch interlock pawl (Fig. 7-8B). With the control lever in this position, the interlock pawl and bail are restricted from rotating, thus the interlock action is attained.

3. Carrier Return to Print Interlock

A print operation occuring during a carrier return operation is undesirable for two reasons.

During homing in a carrier return operation the pinwheel may be rotating to "Home" at a high rate of speed. If a print escapement selection were allowed to operate the chopper bars would try to "set" and "clear" the pins which could result in erroneous homing or parts damage. Also, a printed character while the carrier is returning to the left hand margin is undesirable.

Actually, the carrier return to print interlock consists of two separate and distinct operations. First, let's look at the operation when the carrier return keylever is depressed.

When the carrier return keylever is depressed and extension of the crossover keylever pawl rotates the carrier return interlock top to the rear. Since the carrier return interlock bellcrank is set screwed to the interlock bail the interlock bail also rotates. This causes the lug on the cycle clutch interlock pawl to be positioned in the path of the cycle clutch control lever preventing it from going to the rear and unlatching the cycle clutch if a character keylever were depressed (Fig. 7-8A).

Further depression of the keylever trips off the carrier return cam. This is how the print cycle is interlocked as long as the keylever is held depressed.

If the operator was to release the keylever quickly after depressing it, the interlock described above would be inactive as soon as the keylever restored. Therefore, some method must be used to maintain the print interlock throughout the entire carrier return operation. This is because homing or carrier travel may not be complete.

This additional interlock action is accomplished by an interlock which is operated from the carrier return clutch arm to the interlock bail (Figure 7-9). This interlock maintains the interlock bail in its active position until the carrier return shoe is released from the carrier return clutch spring at the left margin. As the carrier return cam goes toward its high point, it

rotates the carrier return clutch arm which spring loads the carrier return shoe into the clutch spring. An extension on the clutch arm cams the carrier return interlock relief arm, which is mounted to the carrier return interlock bracket on a horizontally elongated hole, top to the front. This results in a pull on the clutch interlock link to the rear. This rotates the interlock bail through the clutch interlock bellcrank, resulting in an interlock of the print mechanism.

When the interlock bail rotates top to the rear the lug on the cycle clutch interlock pawl is positioned in the path of the cycle clutch control lever preventing cycle clutch release.

The spring located between the interlock bracket and the interlock relief arm is used in a normal carrier return to print operation to spring load the relief arm to the rear of its elongated mounting hole. At this time the mounting rivet of the relief arm is the pivot point. If the operator were to simultaneously depress the carrier return keylever and a print keylever the spring serves to prevent parts damage.

As the cam rises it will drive the interlock relief arm top to the front. The interlock bail, at this time, is not free to rotate top to the rear because the cycle clutch control lever has moved to the rear under the lug on the cycled clutch interlock pawl, due to the print operation underway. The pivot point of the relief arm is now transferred to the bottom of the relief arm about the clutch interlock link. As the top of the relief arm is driven forward, the spring between the relief arm and the relief arm bracket is allowed to expand because of the elongated hole in the bracket. This provides the needed relief to prevent parts breakage.

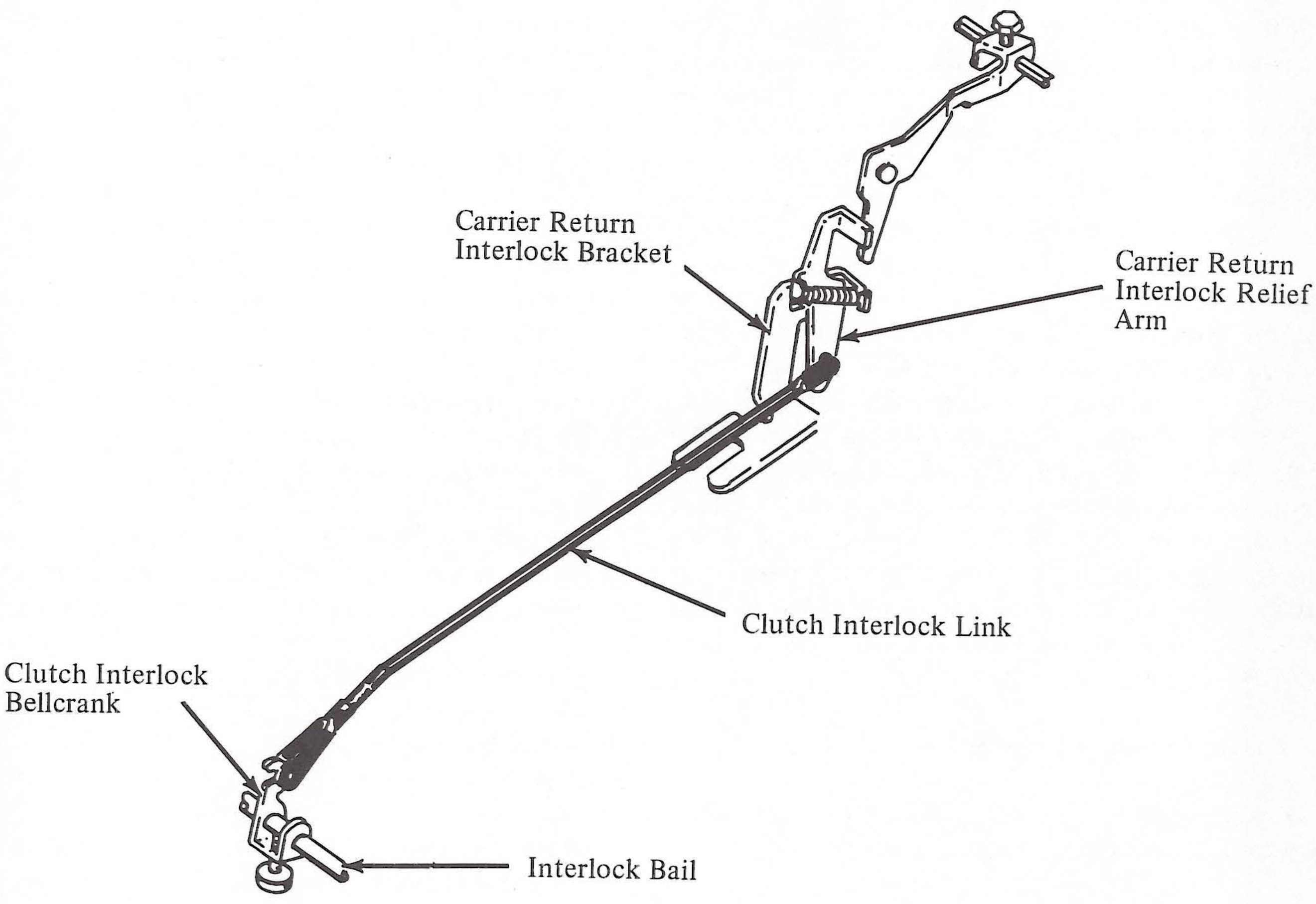


FIGURE 7-9

TABULATION

The tab mechanism on the "Selectric" Composer is quite a bit more sophisticated than the tab mechanism on the "Selectric" Typewriter. It is a powered operation that entails leadscrew homing, a braking action to restrict the carrier from moving until the leadscrew has finished its homing operation, and a cord tightener mechanism to remove the slack in the carrier return cord during the tab operation. The tab mechanism is also designed to differentiate between "long tabs" and "short tabs". On "long tabs" the leadscrew shoe is lifted from the leadscrew to break the coupling between the carrier and leadscrew. On "short tabs" the coupling between the carrier and leadscrew is not broken. Instead the carrier merely follows the leadscrew as it rotates to the home position.

A few areas of the tab mechanism such as the tab set and clear, tab rack, and tab governor are either the same or almost the same as on the "Selectric" Typewriter. For this reason we will avoid or skip lightly over these areas. The tab mechanism is divided into three sections: tab set and clear, tab operation, and interlocks.

1. Tab Set and Clear

The tab set and clear mechanism is much the same as in the base machine. In fact, the tab rack used is a standard 12 pitch tab rack that has every other tab stop removed, making it a six pitch rack. Since every other tab stop is missing, every other spring finger also

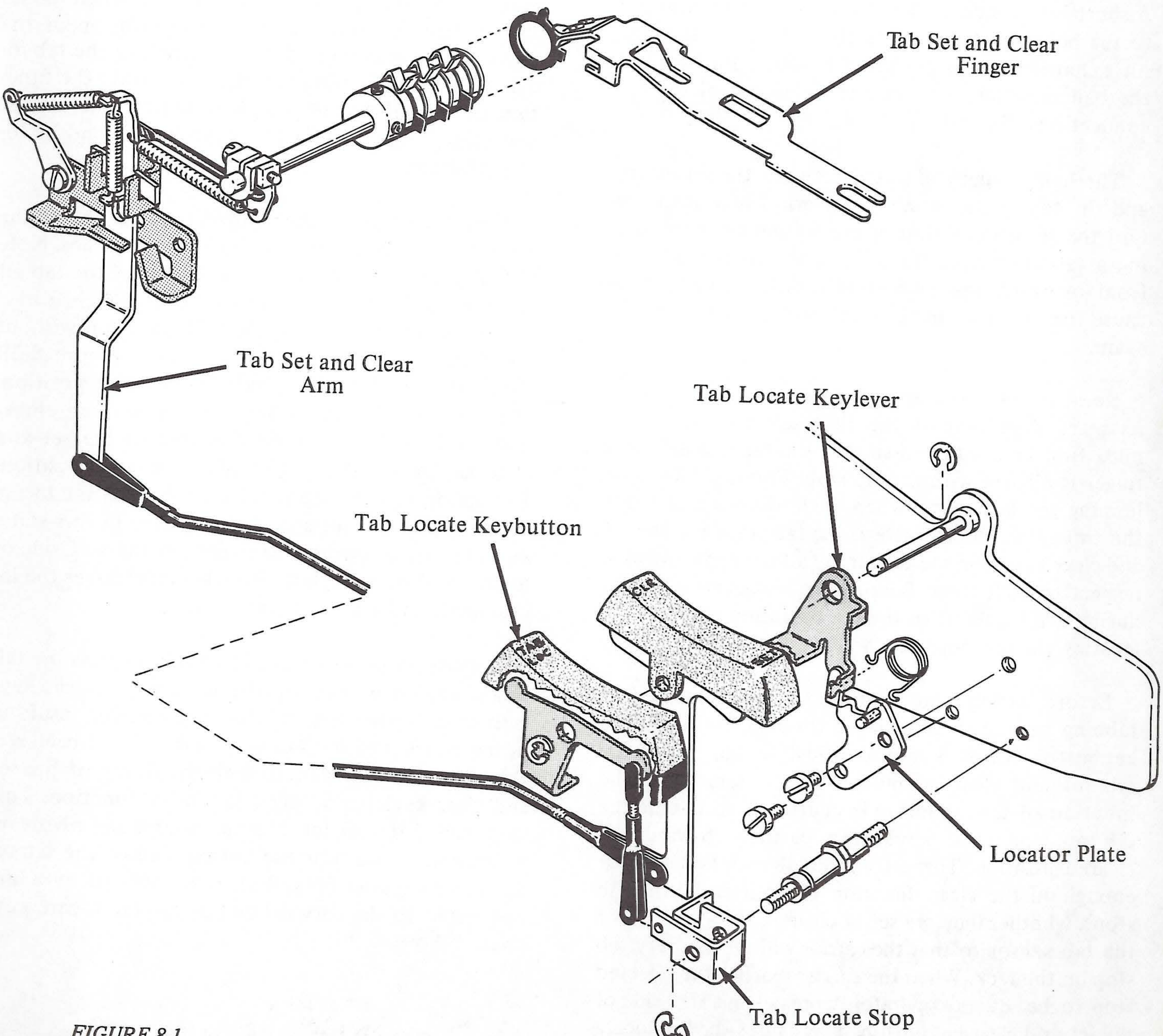


FIGURE 8-1

had to be removed so that during a gang clear operation there would not be an interference between the gang clear finger and the unused spring fingers.

The tab stops, which correspond to the threads on the leadscrew when the leadscrew is homed, are set and cleared by rotating the tab rack the same as on the "Selectric" Typewriter. The stops are moved into either their set or cleared positions by projections on the tab set and clear finger (Fig. 8-1). The set and clear finger is secured to the top of the escapement bracket by two screws.

The linkage from the tab set and clear button back through to the left end of the tab rack is relatively the same as on the base machine. The only difference is that the set and clear arm is mounted further to the rear to make room for the leadscrew bias mechanism. A short link connects the top of the set and clear arm to the bellcrank fastened on the left end of the rack. An extension spring anchored between the arm and the bellcrank serves to bias the play out of the link connections (Fig. 8-1).

The light spring connected between the spring arm and the top of the set and clear arm functions to retard the restoring action of the set and clear arm during a tab clear operation. This prevents the tab rack from overthrowing its neutral position which could cause the tab stop that had just been cleared to be set again.

Because the tab stops are located from 12 to 16 units apart, depending on the pitch selected, the carrier must first be positioned so that the tab set and clear finger is aligned with the tab stop. This is achieved by homing the leadscrew. When the leadscrew is at home the thread on the leadscrew, the tab stop, and the set and clear finger on the carrier are all in alignment with respect to each other. Because the leadscrew is homed during a tab operation, the tab operation is utilized in locating the tab stops that are to be set.

Before setting a tab stop the tab stop is located by tabbing to it. This is achieved through the tab locate keybutton which is mounted just to the left of the tab set and clear keybutton on the same pin. The function of the tab locate keybutton is to actuate the tab set and clear keybutton partially towards its cleared position. This causes the tab rack to rotate far enough in the clear direction to position all the tab stops, whether they are set or cleared, into the path of the tab sensor so that the carrier will tab to every tab stop on the rack. When the carrier reaches the selected stop to be set, the operator depresses the SET side of the set and clear keybutton. This causes the tab locate keybutton to return to its rest position and the selected tab stop to be set the same as it is done on the base machine. The operator repeats this procedure for every tab stop she desires to set.

A hairpin spring provides a toggle action to the tab locate keybutton. This action assures that the button, when depressed, will pivot to its locate position and remain there until the carrier reaches the tab stop to be set. The hairpin spring mounts on a lug on the tab locate keylever and on a pin riveted to the locator plate (Fig. 8-1). This plate is secured to the keyboard sideframe by two screws.

A vertical lug on the locator plate functions as a rest position stop for the tab locate keylever. The toggle spring anchor lug on the keylever is loaded against this vertical lug by the tension of the toggle spring when the locate button is at rest. When the locate button is depressed, the active position of the locate keylever is limited by the action of the tab locate stop (Fig. 8-1). As you will see shortly the function of the tab locate stop is to prevent the tab set and clear keylever from being thrown beyond its locate position.

Figure 8-2A shows the tab locate keylever and the tab set and clear keylever in their rest positions. Note that the tab locate keylever stands clear of the tab set and clear keylever. This permits the set and clear keybutton to be depressed in the SET direction without interfering with the locate mechanism. Figure 8-2B shows the tab locate keylever in its active position. Observe that the locate keylever, in rotating clockwise to its active position, has rotated the set and clear keylever partially towards its cleared position. The action of the toggle spring holds both the locate keylever and the set and clear keylever in this state. As soon as the operator depresses on the SET side of the set and clear keybutton its keylever drives the locate keylever back to its rest position.

Because an operator can forcefully depress the tab locate keybutton causing the tab set and clear keylever to be thrown beyond its locate position resulting in the clearing of the tab stop that had just been set, a stop has been added to limit the throw of the set and clear keylever during a tab locate function. This stop, called the tab locate stop, mounts and pivots on an eccentric stud near the bottom end of the tab set and clear keylever (Fig. 8-1). It is operated by a link connected to the forward end of the tab locate key. lever.

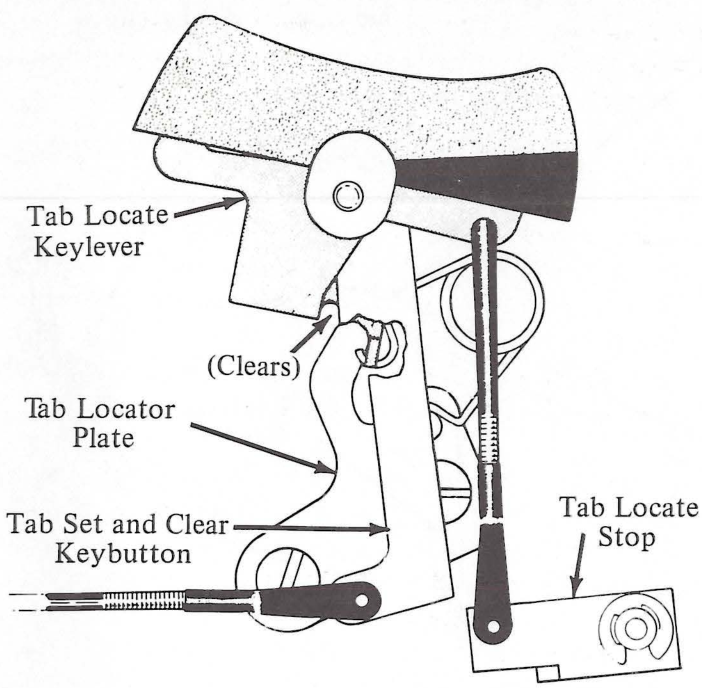


FIGURE 8-2A

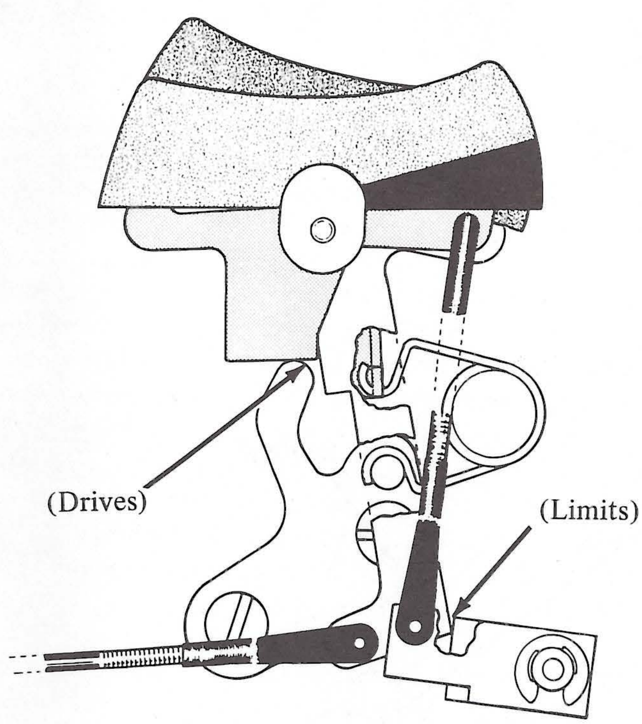


FIGURE 8-2B

When the tab locate keybutton is at rest the stop is positioned so that it does not interfere with the clear operation of the tab set and clear keylever. This is illustrated by Figure 8-2A. Depressing the tab locate button causes the stop to pivot into the path of the set and clear keylever as shown in Figure 8-2B. With the stop in this position the set and clear keylever can only move to its tab locate position.

2. Tab Operation

The source of power for the tab mechanism comes from a cam on the operational shaft. This cam, which is double lobed for speed, is called the tab/backspace operational cam. It is used to power both the tab and backspace mechanisms. The functional aspects of this operational area parallel the spacebar/backspace operational area on the "Selectric" Typewriter. Because of this it will only be necessary to describe the mechanism and operation from the depression of the tab keybutton to the release of the tab interposer and then from the pulling down of the tab operational latch on through the remainder of the mechanism.

The tab/backspace operational bracket is located on the right side of the machine just to the left of the chopper block assembly. Because the tab keylever is located on the left side of the keyboard, linkage must be provided to carry the motion of the tab keylever to the tab interposer which is located on the tab/backspace operational bracket. The tab bail, which mounts and pivots between the keyboard sideframes (Fig. 8-3), carries the motion from the left hand tab keylever to the right hand tab keylever. Both keylevers at the rear mount in the keylever bearing support, and at the front operate in the slots of the front keylever guide comb. Extension springs, which are anchored to brackets mounted on the inner face of each sideframe, load the keylevers up into their rest position.

The tab keylever pawl, mounted on the right hand keylever by a shouldered rivet, is spring loaded toward the rear by an extension spring that is anchored between the pawl and keylever. A pawl guide stud aligns the pawl with the tab interposer. Depressing the tab keybutton causes the keylever pawl to trip off the tab interposer. As the interposer slides to the rear it pushes the tab operational latch under the cam follower and fires the tab/backspace cam. The cam rotates causing a downward pull to be produced on the tab operational latch.

The motion produced by pulling tab operational latch down is used to actuate the leadscrew homing mechanism, engage the tab brake, operate the cord tightener mechanism, and to latch out the tab lever if a long tab is decoded. How each one of these mechanisms functions is explained in the remainder of this section.

Beginning with the leadscrew homing operation; the downward motion of the tab operational latch causes the tab latch arm to pivot top to the rear

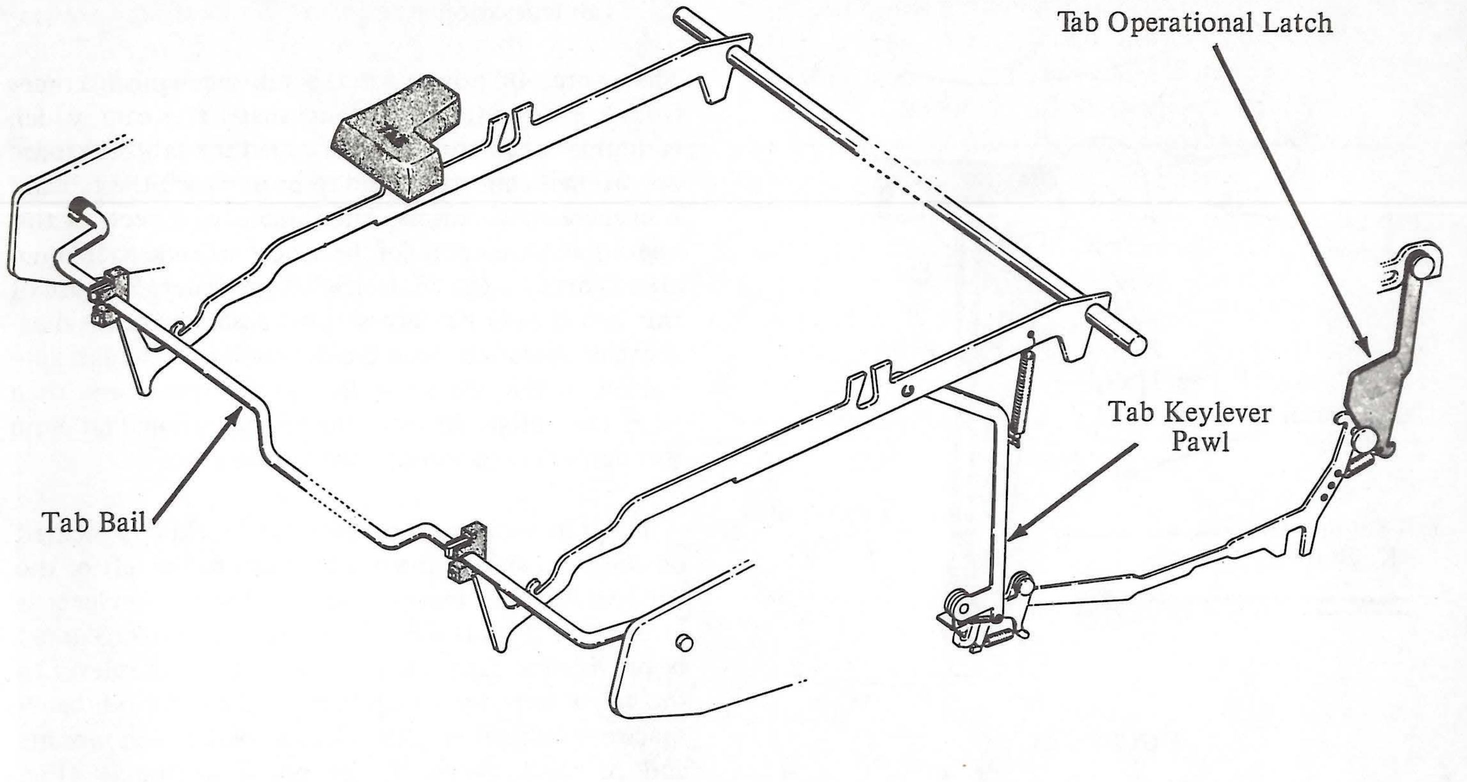


FIGURE 8-3

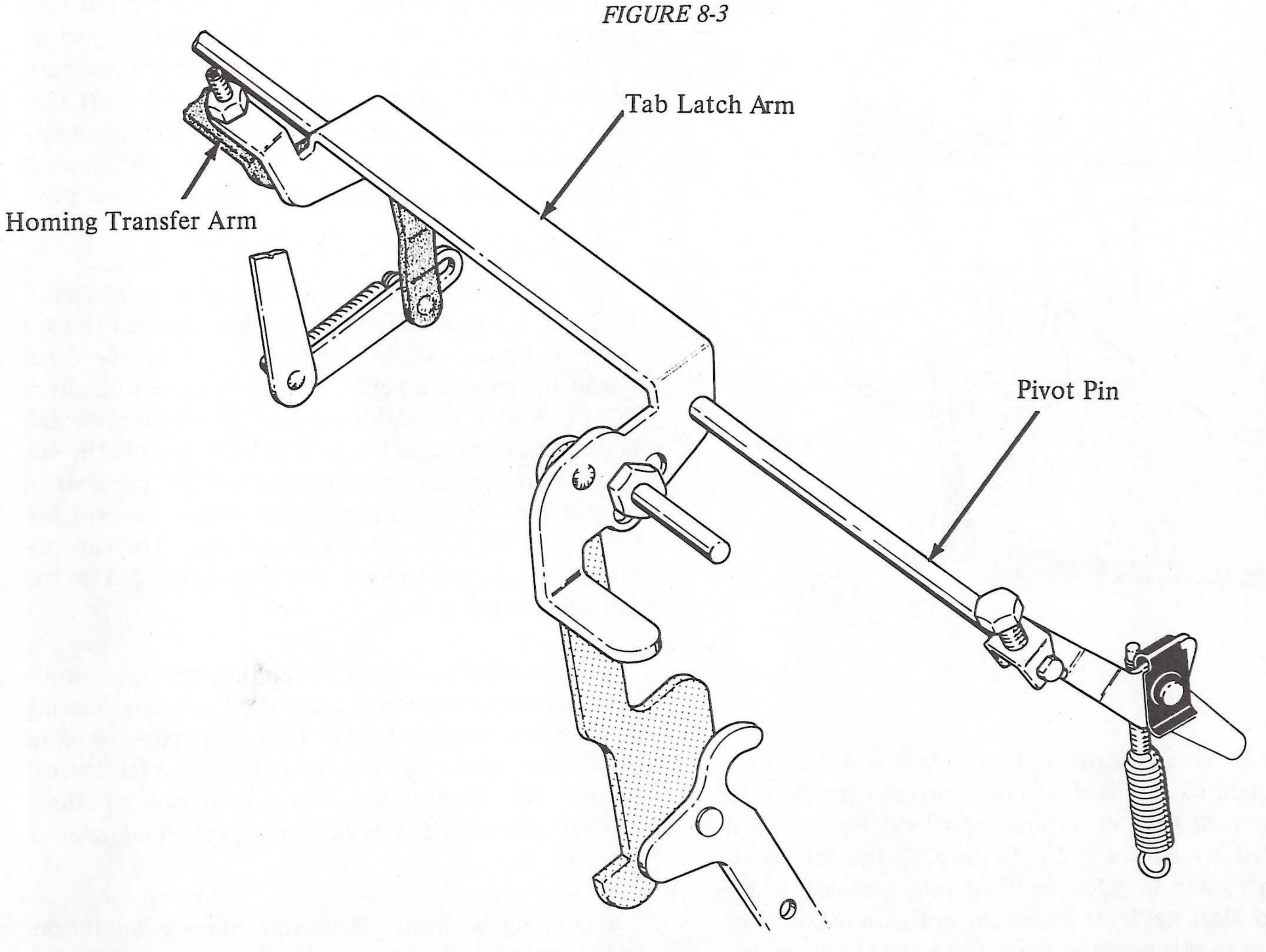


FIGURE 8-4

about the carrier return latch actuating arm pivot pin (Fig. 8-4). The adjusting screw located at the left end of the tab latch arm drives the homing transfer arm in the top to the rear direction initiating the leadscrew homing operation. Recall that during a carrier return operation the homing mechanism is actuated in exactly the same way. An adjusting screw in the carrier return arm drives the homing transfer arm counterclockwise as the carrier return operational latch is pulled down. Thus leadscrew homing during tab, from the homing transfer arm on, is exactly the same as during the carrier return.

The function of the tab brake is to hold the escapement shaft from rotating so that the carrier will not move until after the leadscrew homing operation has completed. This is necessary because the carrier can, if not coupled to the leadscrew shoe, travel a given number of units in less time than the leadscrew. This means that without the brake the carrier could reach a tab stop and drop the shoe into the wrong thread before the leadscrew has reached the home position. This would result in the carrier coming to rest 1/6 of an inch beyond the set tab stop.

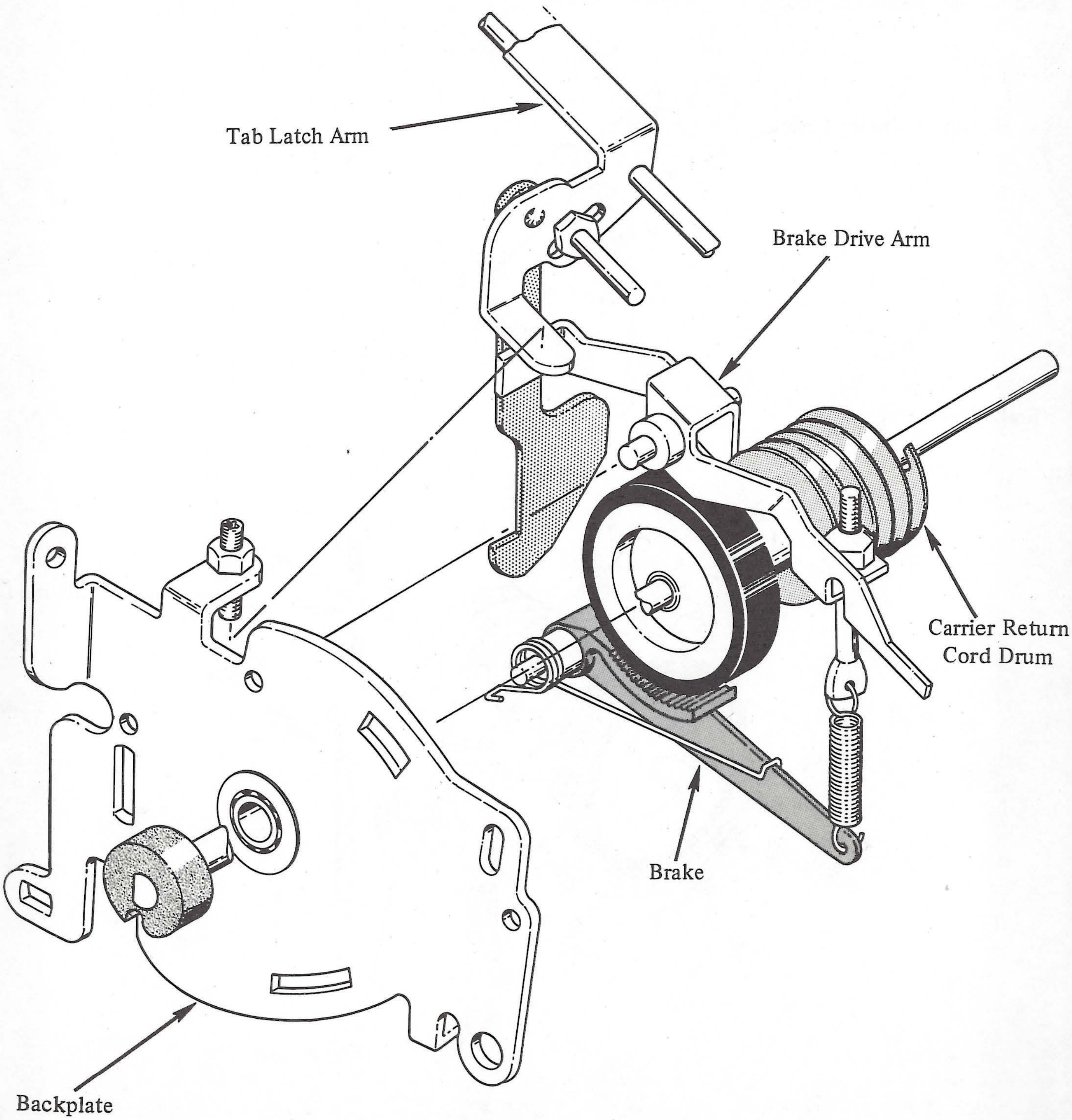


FIGURE 8-5

The brake, which acts on a rubberized portion of the carrier return cord drum, is engaged and latched into its holding position by the motion of the tab latch arm. When the homing operation is finished the brake is unlatched and the carrier begins its tab operation. On tab operations where the leadscrew is already at home the brake is not allowed to latch. Although it still engages, the carrier is only held momentarily until the cam has gone over its high point.

The brake drive arm carries the motion from the tab latch arm to the brake. The drive arm pivots on a stud on the inside of the backplate assembly. The left end of the drive arm rests directly beneath the horizontal lug on the right hand end of the tab latch arm (Fig. 8-5). When the tab operational latch is pulled down, the lug on the tab latch arm forces the brake drive arm to pivot counterclockwise. The right hand end of the drive arm, which is connected to the brake by the drive arm stud and spring, rises, pressing the brake against the brake drum. The brake, like the drive arm, pivots on a stud on the inside of the backplate. A light hairpin spring loads the brake into its rest position when the drive arm is permitted to restore.

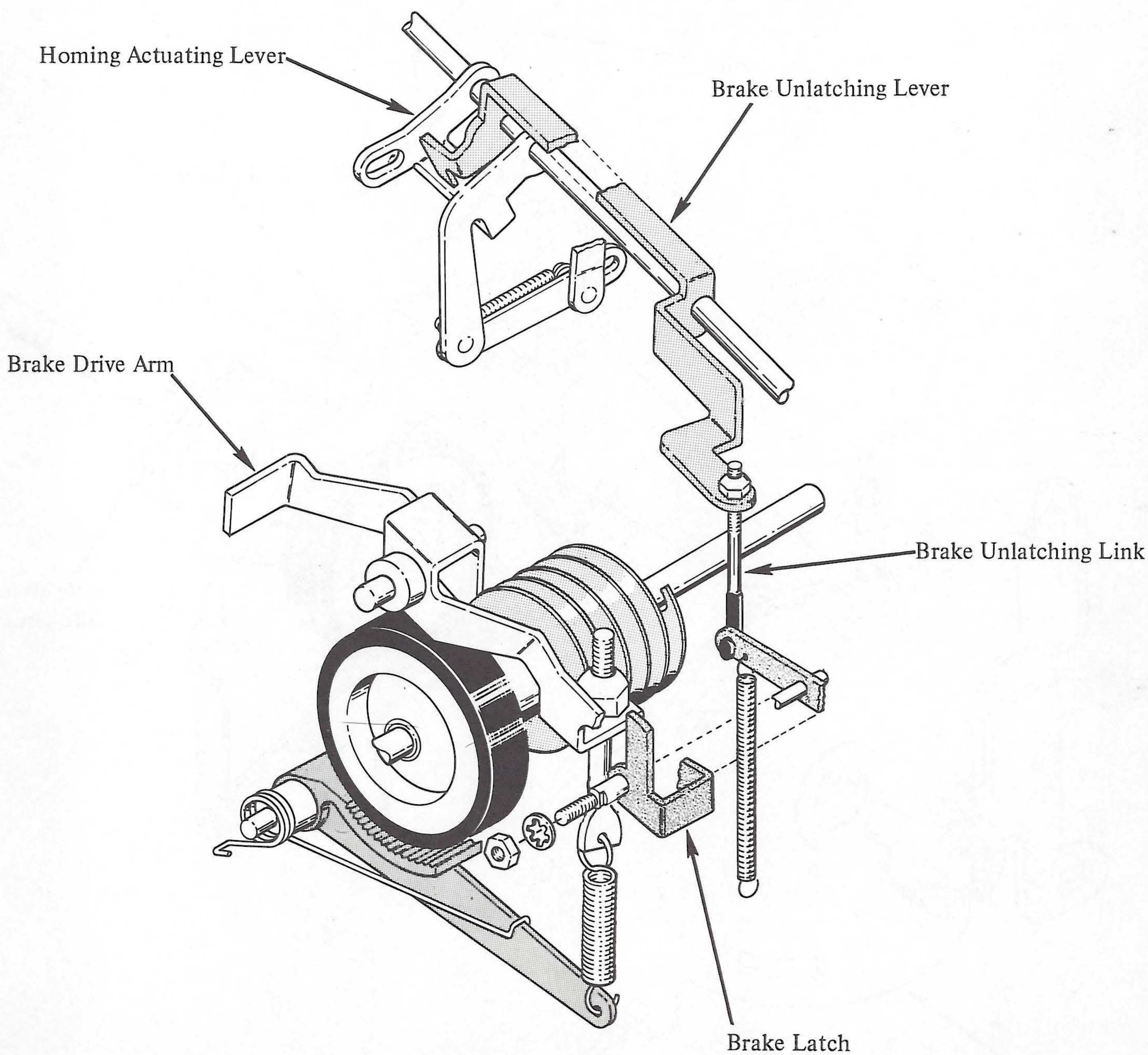


FIGURE 8-6

A latch, called the brake latch, holds the drive arm in its active position until the leadscrew reaches its home position. The latch pivots on an adjustable stud which is mounted on the inside of the backplate below the right hand end of the drive arm. An extension spring loads the latch counterclockwise towards the horizontal lug of the drive arm (Fig. 8-6). When the drive arm pivots to engage the brake, the vertical arm of the brake latch is allowed to rotate beneath the lug of the arm to latch the arm in its active position. The arm remains latched until a pull is produced on the brake unlatching link. If the leadscrew is already at home when the drive arm is activated, the latch will not be allowed to rotate into its latching position.

The action of the brake latch is controlled by the homing actuating lever. The brake unlatching lever, which mounts and pivots about the pivot pin, serves to carry the motion of the homing actuating lever to the brake latch (Fig. 8-6). If the leadscrew is not at home at the beginning of a tab operation the homing actuating arm is driven counterclockwise and then held in this position for the duration of the homing operation. This action causes the brake latch to rotate beneath the lug of the drive arm to latch the brake in its engaged position. As soon as the leadscrew reaches its home position the homing actuating arm is restored back to rest. This restoring action drives the brake unlatching lever clockwise unlatching the brake.

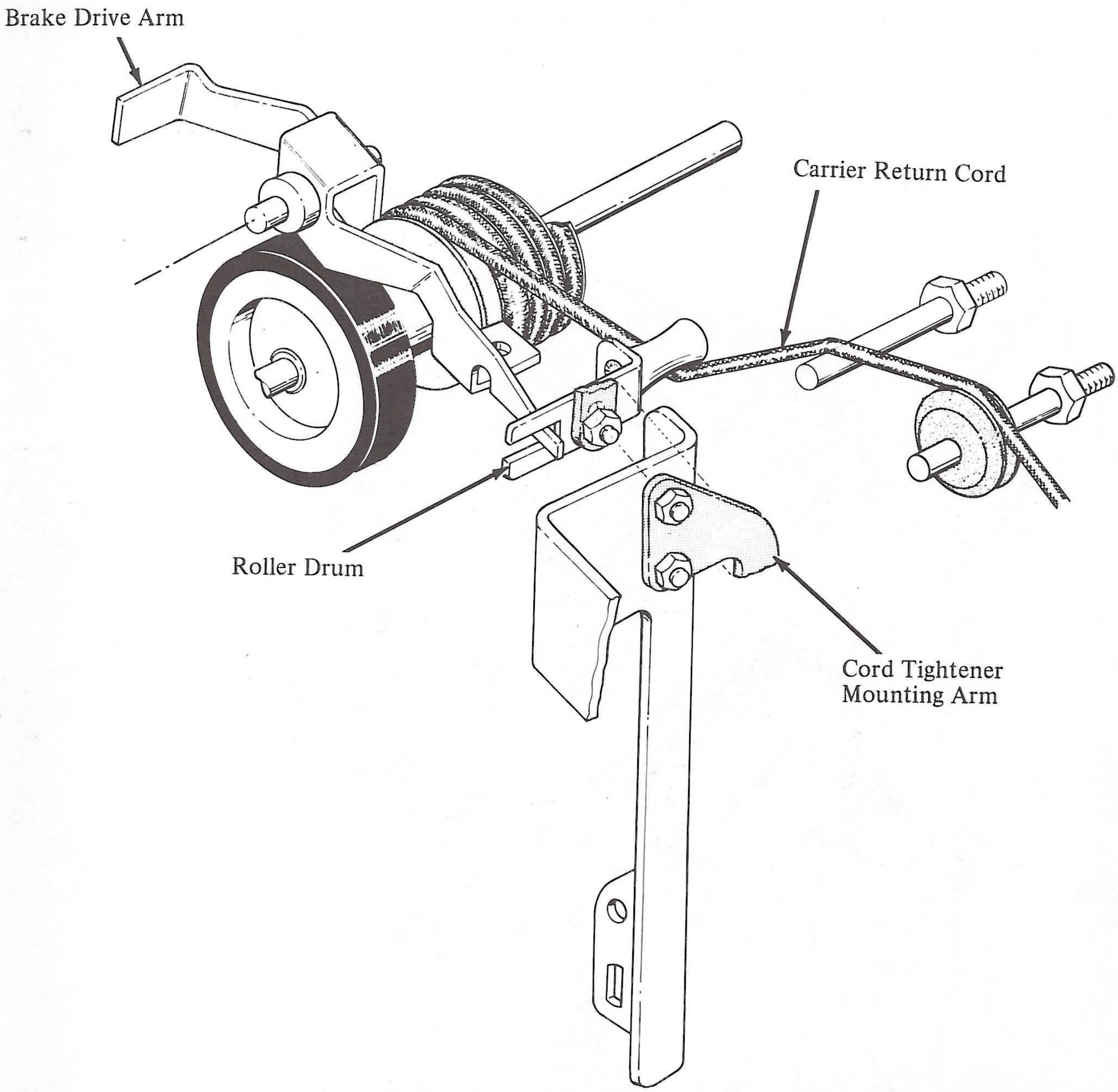


FIGURE 8-7

If the leadscrew were already at home when the tab operation began, the homing actuating arm would remain at rest throughout the tab operation.. Thus, the brake latch would remain inactive. The brake would only engage the drum momentarily as the cam passes over the high point.

Even though the brake engages and holds the escapement shaft from moving before the shoe is disengaged from the leadscrew, the carrier still moves to the right slightly as the shoe is disengaged. This is due to the stretching of the carrier return and tab cords. The cord tightener mechanism helps to reduce this movement. It consists of a roller mounted on an arm which, when operated, presses down on the carrier return cord between the cord drum and the guide roller. It removes all slack and keeps the travel of the carrier to a maximum of 1/32". The stud mounted on the power frame between the guide roller and the cord drum prevents the cord from being pulled down on the drive belt (Fig. 8-7).

The roller arm pivots about a shouldered screw which is secured to the cord tightener mounting arm (Fig. 8-7). The mounting arm fastens to the upper end of the feed roll center support bracket by two screws. The rear of the roller arm is slotted and receives its motion from the right hand tip of the brake drive arm. The hole in the mounting arm that accepts the pivot screw is elongated vertically so that the roller may be adjusted with respect to the cord.

Now that we have described the tab homing, tab brake, and cord tightener operation, let's proceed into the tab mechanism associated with the carrier. When a tab operation begins, motion must be carried from the tab latch arm to the carrier. This motion is needed to disengage the shoe from the leadscrew and latch the tab lever out. The motion is carried through the tab torque bar which runs the width of the machine

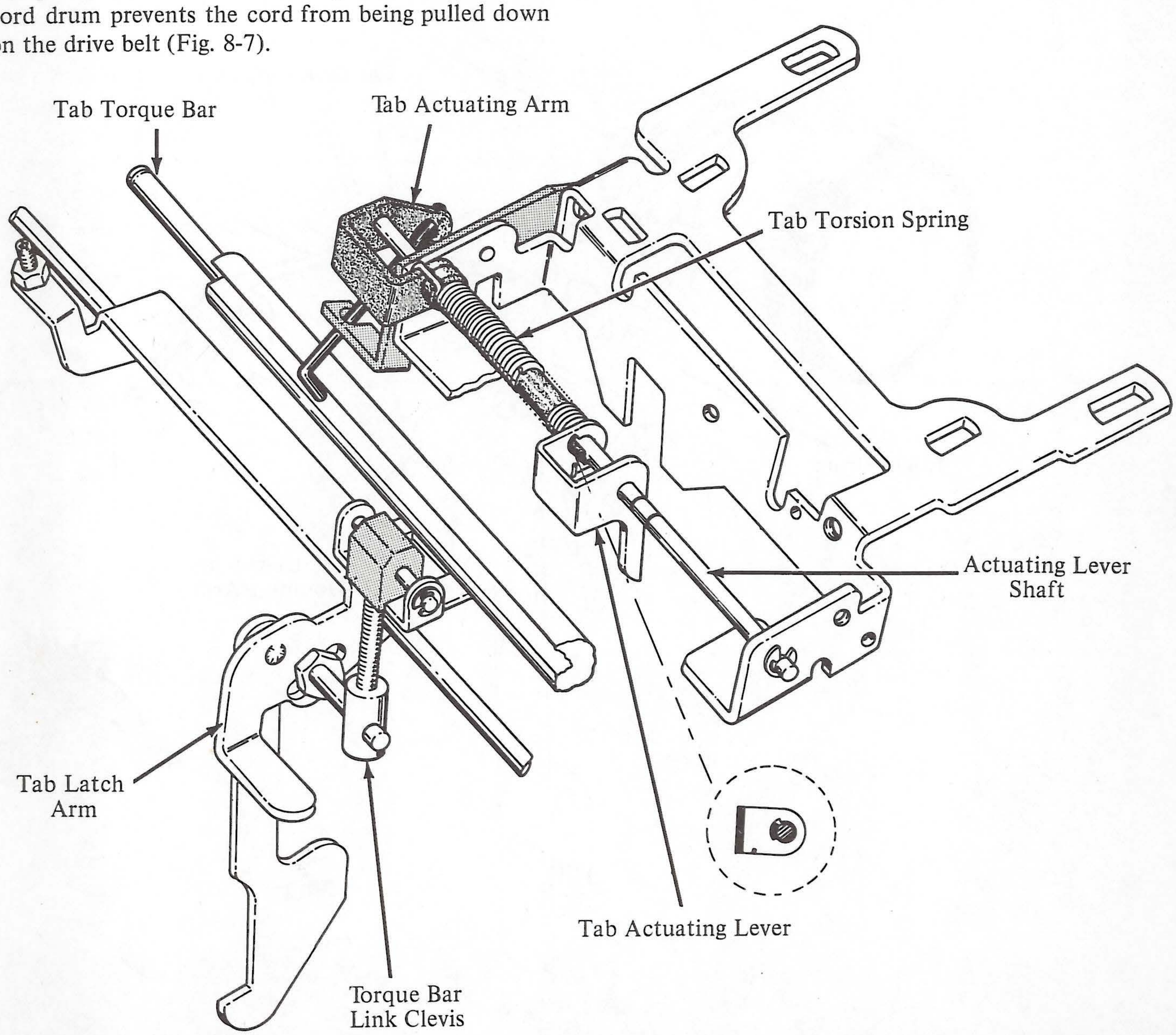


FIGURE 8-8

behind the leadscrew. The torque bar is supported at the left by the machine powerframe and at the right by the tab rack mounting plate.

The tab latch arm is connected to the tab torque bar through a linkage. A stud mounted on the right side of the tab latch arm fits in a hole in the torque bar link clevis. The upper end of the link is secured to the tab torque bar by a pin which is anchored to two ears that project off the rear lip of the torque bar. "C" clips at each end of the pin secure the pin in place (Fig. 8-8). Hence, when the tab operational latch is pulled down the torque bar is rotated top to the rear.

The rotational motion of the torque bar is carried to the carrier by the tab actuating link. The link, which is mounted on the carrier, has a hook shaped end that rides in the groove of the tab torque bar. Any time that the torque bar is rotated a pull is produced on the link. The forward end of the actuating link is anchored to the tab actuating arm (Fig. 8-8). This arm mounts and pivots about the left end of the tab actuating lever shaft. A guide plate mounted on the left face of the escapement bracket by two screws functions to hold the link engaged in the groove of the torque bar. The actuating lever shaft, which serves purely as a pivot pin, mounts across the rear of the carrier on the escapement bracket. A "C" clip on the right end secures the shaft laterally in place.

When a pull is produced on the tab actuating link it causes the tab actuating arm to pivot top to the front about its shaft. The motion of the arm is carried via the tab torsion spring to the tab actuating lever which also mounts and pivots about the actuating lever shaft. The purpose of the torsion spring is to provide a spring relief between the actuating arm and the actuating lever. On a "short tab" the actuating lever is restricted from rotating; therefore, the motion of the actuating arm is absorbed by the torsion spring. The torsion spring is pre-loaded during assembly. The load is maintained through a lug on the right end of the sleeve portion of the actuating arm projecting into a window in the actuating lever (Fig. 8-8). During "long tabs" the actuating arm, torsion spring, and actuating lever effectively operate as one solid piece.

The purpose of the tab actuating lever is to pivot the tab lever into its active position. The tab lever, which mounts on the escapement bracket by a shouldered rivet (at its left end), is located directly beneath the actuating lever shaft (Fig. 8-9). The mounting hole in the tab lever is elongated so that the lever may slide laterally during its operation. An extension spring located beneath the tab lever loads the tab lever toward the left (Fig. 8-9). This spring, which is anchored to a spring lug on the underside of the escapement bracket, fastens in a square hole in the tab

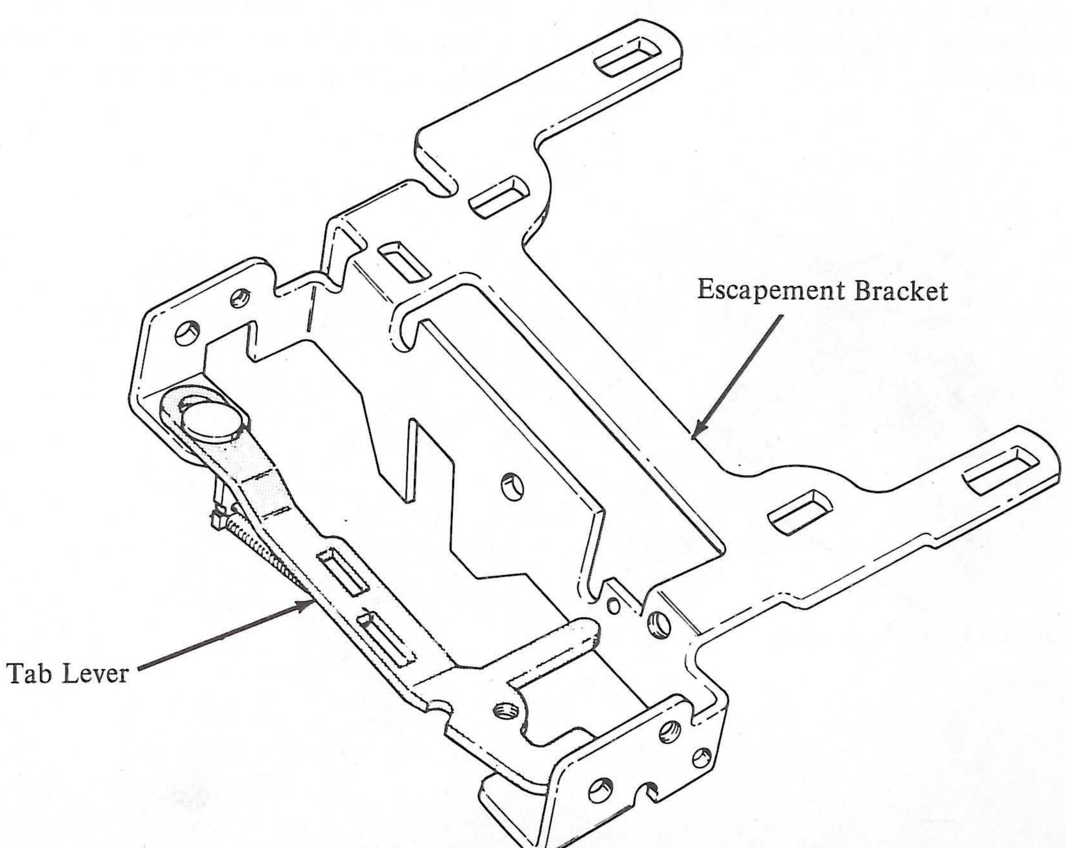


FIGURE 8-9

lever. A spring hooked to the shoe arm lever provides the tension that loads the left-hand end of the tab lever against the escapement bracket (Fig. 8-13).

As the torsion spring rotates the tab actuating lever clockwise, the lug on the actuating lever that projects into a rectangular hole in the tab lever drives the right end of the tab lever towards the tab rack. Just before the tab lever reaches its active position the tab lever latch, which pivots on a screw that is threaded into the escapement bracket, rotates into position to hold the tab lever out (Fig. 8-10). An extension spring, anchored in a hole in the escapement bracket and to the formable stop lug, loads the latch in the latching direction.

The tab lever latch is mounted in a manner so that its front to rear position can be adjusted. By loosening the lock nut on the mounting screw and then threading the screw in or out of the escapement bracket, the front to rear position of the latch can be altered.

From Figure 8-10 you can see that the tab lever will unlatch if the tab lever is shifted to the right on its elongated mounting hole. This is exactly how the tab lever is unlatched during a tab operation. When the tab lever is latched out, the tab sensor on the end of the tab lever moves out into the path of the set tab stop on the tab rack (Fig. 8-11). When the sensor strikes the set tab stop the tab lever is stopped while the carrier and tab latch continue to move in the tab direction. Thus, the tab lever becomes unlatched permitting the leadscrew shoe to drop back into the leadscrew to stop the carrier.

The sensor is a small pivoting lever mounted on the underside of the tab lever by a screw and spacer. The sensor is spring loaded counterclockwise by a small hairpin spring mounted on the top side of the lever. The spring fits loosely over the portion of the sensor mounting screw that extends above the tab lever. The action of this spring is opposite to what you might expect; it comes from the loops of the spring attempting to close rather than open.

The tab sensor has two other functions. It provides a solution to the interference problem that exists between the tab lever and the set tab stops when the tab lever is latched out during a carrier return operation. The sensor is merely cammed clockwise out of the way as the carrier moves past the set tab stops during a "catch" tab operation. The third function of the sensor is to sense whether the tab operation is a "long tab" or "short tab". If it's a "long tab", the shoe must be lifted out of the leadscrew while if it's a "short tab" the shoe must remain engaged. How the leadscrew shoe is disengaged will be explained shortly.

When the carrier is resting close enough to a set tab stop for the tab stop to be in the path of the tab sensor (as the tab lever begins to latch out), the tab stop will block the sensor preventing the tab lever from latching out. The motion of the tab actuating arm is absorbed by the tab torsion spring. This is during a "short tab" operation. It is not necessary for the tab lever to latch out because the carrier is resting closer than 1/6" away from the tab stop. This means that the leadscrew shoe is already engaged in the

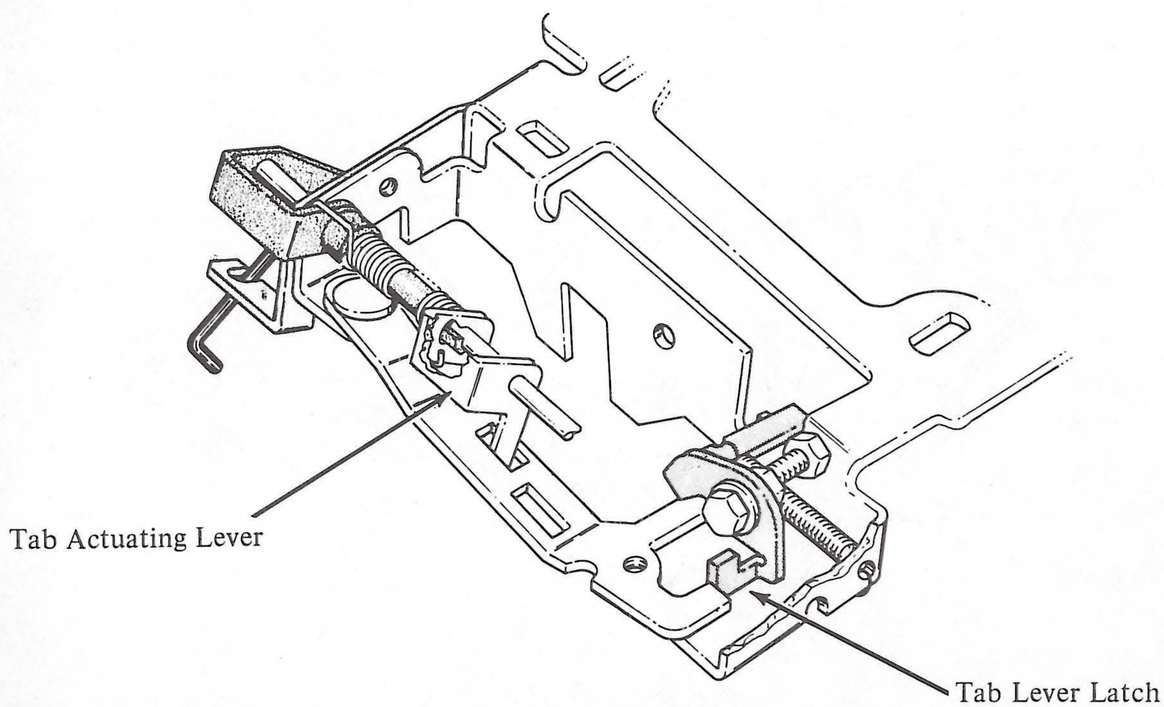


FIGURE 8-10

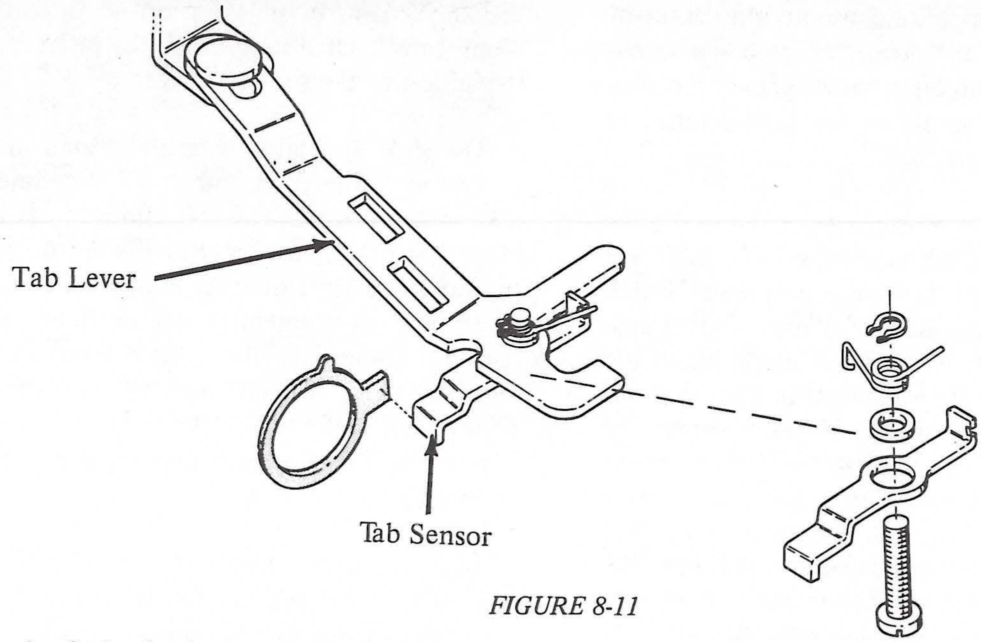


FIGURE 8-11

correct thread of the leadscrew and that when the leadscrew is homed at the beginning of the tab operation the carrier will follow the leadscrew to its correct position. If the leadscrew shoe were disengaged from the leadscrew on a short tab it may be possible for the shoe to get ahead of the leadscrew due to the looseness of the shoe mounting and the inherent slack in the carrier return cord. This would result in the carrier stopping one tab stop too far to the right.

At the end of a tab operation, after the carrier comes to rest, the position of the tab sensor must be slightly to the right of the tab stop that the carrier had just tabbed to (Fig. 8-12). This allows the tab lever to latch out if a second tab operation is initiated before the carrier moves. If the tab stop were allowed to block the sensor the tab mechanism would become inoperative because the shoe couldn't be disengaged from the leadscrew and the leadscrew would already be at home. This condition can exist if the tab rack is adjusted too far to the right.

For the same reason mentioned in the above paragraph the width of the tab sensor must be narrower than the space between two tab stops. If two adjacent tab stops are set and the operator tabs to the first tab stop, the tab sensor must come to rest between the two tab stops as shown in Figure 8-12. If the operator initiates a second tab operation before the carrier has moved, the tab lever must be able to latch out so that the shoe can be disengaged from the leadscrew. If the second tab stop is allowed to block the sensor, the tab mechanism will become inoperative for the same reason as mentioned in the previous paragraph. This condition can exist if the tab rack is adjusted too far to the left.

The width of the sensor and the adjustment of the tab rack assures that the tab mechanism will always tab accurately to any tab stop as long as the carrier is at least four units away from that tab stop. In many instances the machine will tab to a stop from three and even two units away; however, only four units are guaranteed. If a tab is attempted from less than four units the sensor may not sense the desired stop and a tab will be completed to the next set tab stop. This is because of the required clearance illustrated in Figure 8-12 plus part tolerances.

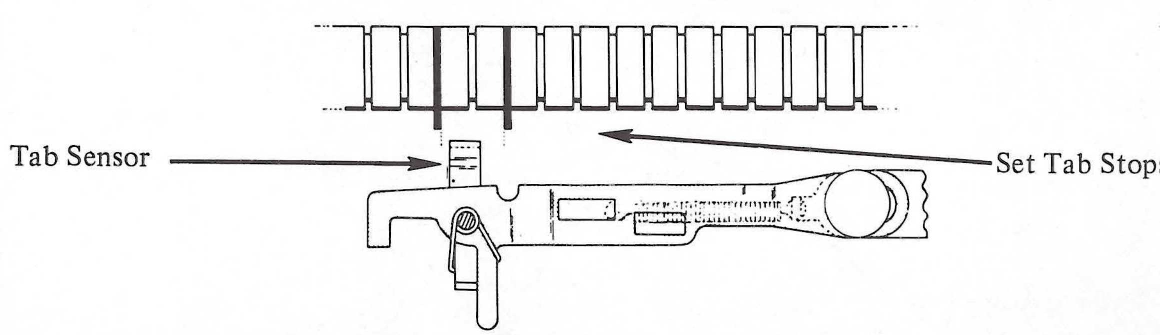


FIGURE 8-12

When the tab rack is in adjustment, the width of the sensor should cause a "short tab" to occur whenever the carrier gets within eight units of a set tab stop in the 1/72 pitch, nine units in the 1/84 pitch, and eleven units in the 1/96 pitch.

Whenever the tab lever is latched out the leadscrew shoe is disengaged from the leadscrew. The tab lever motion is picked up by the shoe arm lever which mounts and pivots on the actuating lever shaft beside the actuating lever (Fig. 8-13). The vertical lug of the shoe arm lever projects into a window in the tab lever. When the tab lever moves toward the rear it causes the lever to pivot clockwise about its shaft. The clockwise motion is then used to rotate the shoe release lever which mounts and pivots on the same stud that mounts the shoe arm to the escapement bracket. The left end of the shoe release lever rests beneath a lug of the shoe to disengage from the leadscrew. The mounting hole in the shoe arm is elongated laterally so that the shoe arm may be rocked clockwise to remove the shoe from the leadscrew (Fig. 8-14). An extension spring, fastened to the left end of the release lever and anchored to the escapement bracket, loads the release arm into its rest position.

The shoe width makes the shoe see a vertical force component as the leadscrew rotates during either an escapement or backspace operation. To insure that this vertical component, and the high force generated at the end of a tab, cannot cause the shoe to become disengaged from the leadscrew, a shoe arm latch holds the shoe engaged in the leadscrew. The latch prevents the shoe from disengaging on all operations except "long tabs". On "long tabs" the latch is released by the action of the shoe arm lever.

The shoe arm latch lever illustrated in Figure 8-14 is riveted at the right end to the shoe release lever by a shouldered rivet. The left end mounts on the same stud that the release lever pivots on. Both the mounting hole and rivet hole are elongated so that the latch lever may slide laterally left or right. An extension spring anchored to the release lever loads the latch lever towards the left against the shoe arm. The formed lug at the top of the latch lever bears against a surface on the shoe arm directly above the shoe arm mounting stud (Fig. 8-15).

Because of the way the shoe arm is mounted on the escapement bracket the shoe arm must drive the latch lever towards the right as the shoe is disengaged from the leadscrew. If the latch lever is blocked from sliding toward the right, then the shoe cannot be disengaged from the leadscrew. This is exactly what happens. A heavy latch stop, fastened to the escapement bracket, sits directly in the path of the right hand end of the latch lever (Fig. 8-15). Any time that the latch lever attempts to slide toward the right while the release lever is at rest, it is blocked by this latch stop.

During a "long tab" the right end of the release lever is driven down by the shoe arm lever. This causes the right end of the latch lever to drop below the

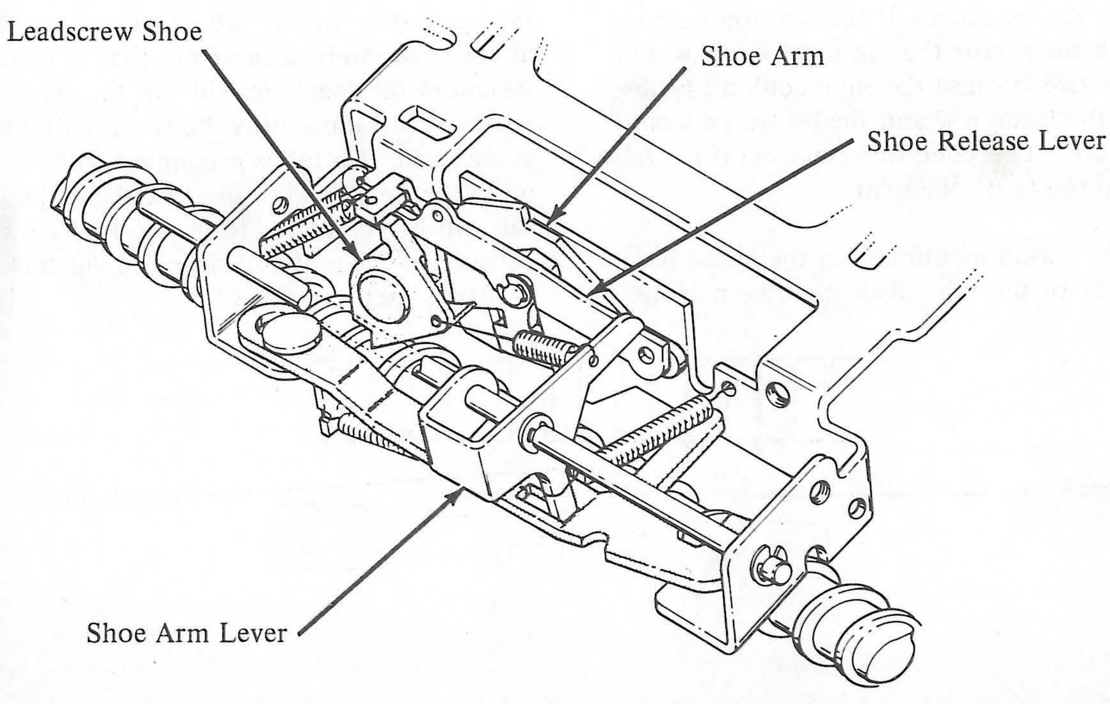


FIGURE 8-13

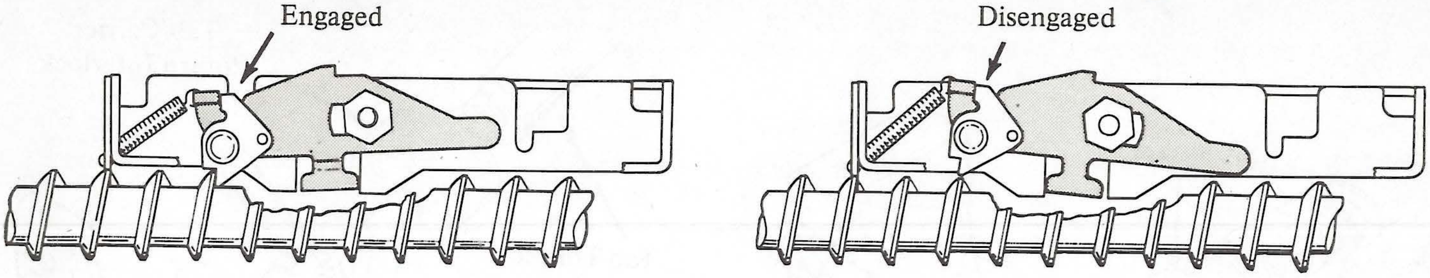


FIGURE 8-14

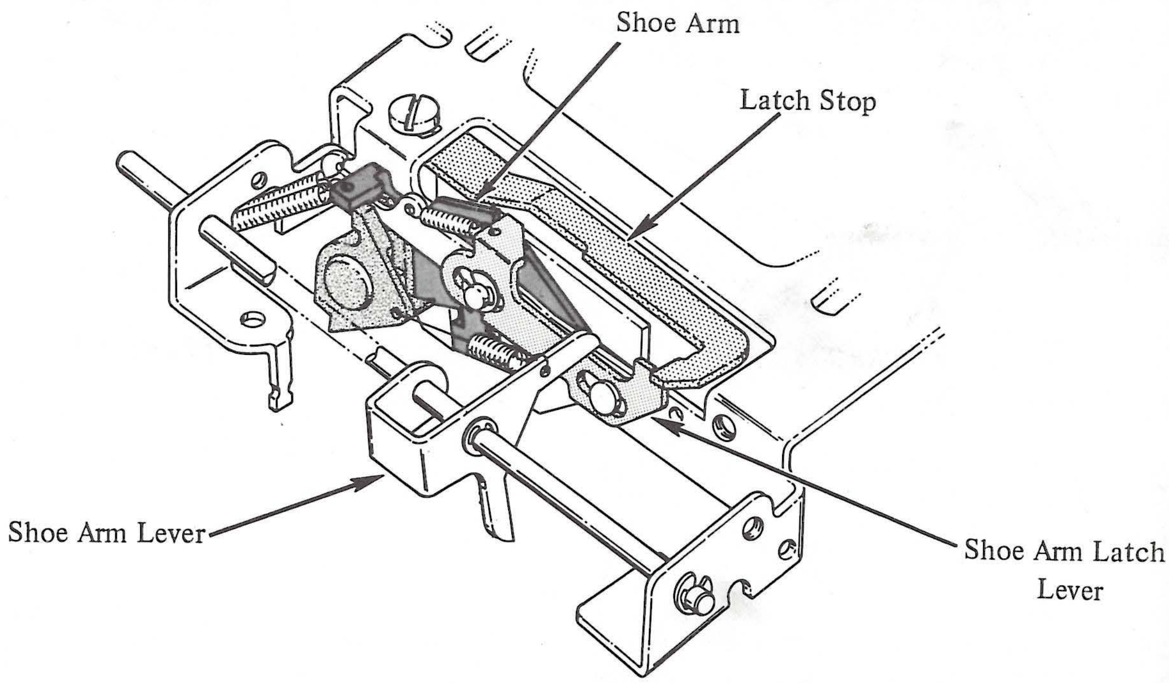


FIGURE 8-15

latch stop. The latch lever is then free to slide to the right on its elongated holes as the shoe arm pivots disengaging the shoe from the leadscrew.

The same vertical component of force that tends to force the shoe up out of the leadscrew also tends to bow the leadscrew down in the center. A leadscrew support mounted beneath the center of the leadscrew eliminates this bowing action (Fig. 8-16). The support consists of a Delrin® gear mounted on an eccentric stud which is secured to the machine powerframe by a bristo screw. The bristo screw is accessible from the bottom of the machine. The forward end of the eccentric stud is slotted so that it can be rotated with a screwdriver.

3. Tab To Carrier Return Interlock

The tab to carrier return interlock action permits a tab operation to interrupt and supersede a carrier return operation. This interlock is what produces the feature known as "catch tab". The action is produced by a small lever set screwed on the right hand end of the tab torque bar. This lever is called the tab/carrier return interlock (Fig. 8-17). Its function is to unlatch the carrier return latch if a tab operation is initiated during a carrier return. It will not prevent the carrier from latching if a carrier return operation is initiated during a tab operation. Hence, if the carrier was moving to the right in a tab operation and a carrier return was initiated the carrier would return to the left hand margin, unlatch the carrier return operation, and move once again in the tab direction since the tab lever is still latched out. Upon reaching the first set tab stop the tab would unlatch as the operation is complete.

At this time there is no interlocking between tab and print. If an operator were to operate tab and then print, a possible interference between homing and escapement selection could occur.

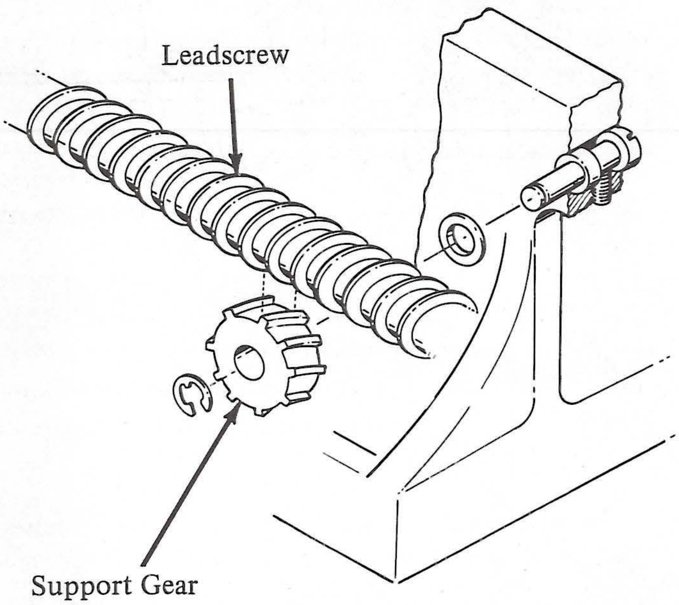


FIGURE 8-16

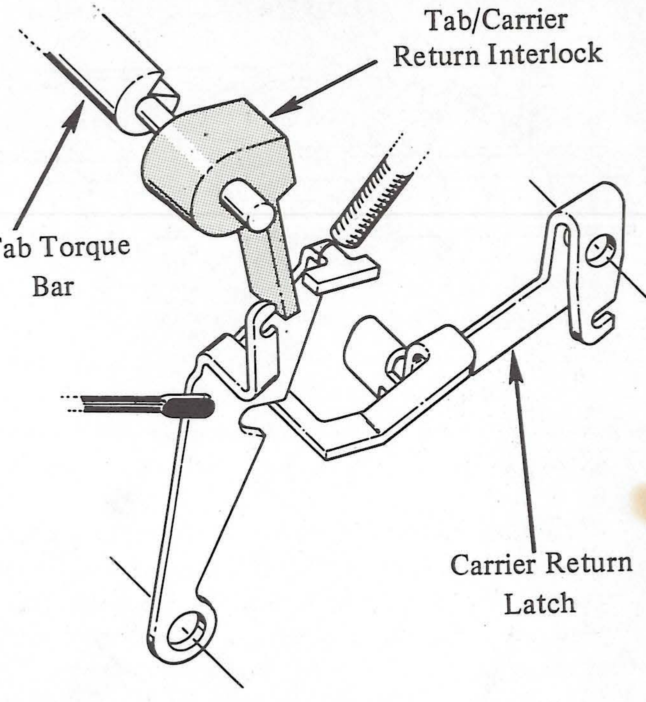


FIGURE 8-17

BACKSPACE

The backspace mechanism is a rotary mechanism that steps the leadscrew backwards in unit increments. This is achieved through a large ratchet wheel fastened to the left end of the pinwheel shaft. Each time a backspace operation is initiated a feed pawl, powered by the same operational cam that powers the tab mechanism, drives the ratchet wheel backwards. This causes the pinwheel to rotate backwards until the backspace holding pawl cams over and drops behind the next escapement pin. The pinwheel settles back against the holding pawl and a unit of backspace motion to the carrier is accomplished.

The keyboard contains two backspace keylevers; a unit backspace keylever and a character backspace keylever. The unit backspace keylever, which has the repeat/non-repeat feature, is used whenever the operator desires to either backspace one unit at a time or to repeat backspace. The character backspace is a feature which allows an operator to backspace a whole character at a time automatically. This feature is made possible because the pinwheel always retains the escapement selections that are involved in the last revolution of the pinwheel. In other words, each time a character is selected at the keyboard its escapement value is placed into memory as the escapement selection mechanism programs the pinwheel for that escapement selection. This selection remains in memory until the pinwheel makes one complete revolution.

A character backspace operation is achieved by simply latching the backspace mechanism into a repeat mode and then using a set pin sensing device to unlatch the mechanism when the pinwheel has backed up to a previous set pin.

The character backspace operation is only accurate within the memory of the pinwheel which is one revolution or 60 pins. This means that the capacity of memory ranges from a minimum of six 9-unit characters to a maximum of eighteen 3-unit characters. Also, the character backspace operation will not necessarily be accurate when backspacing after a homing

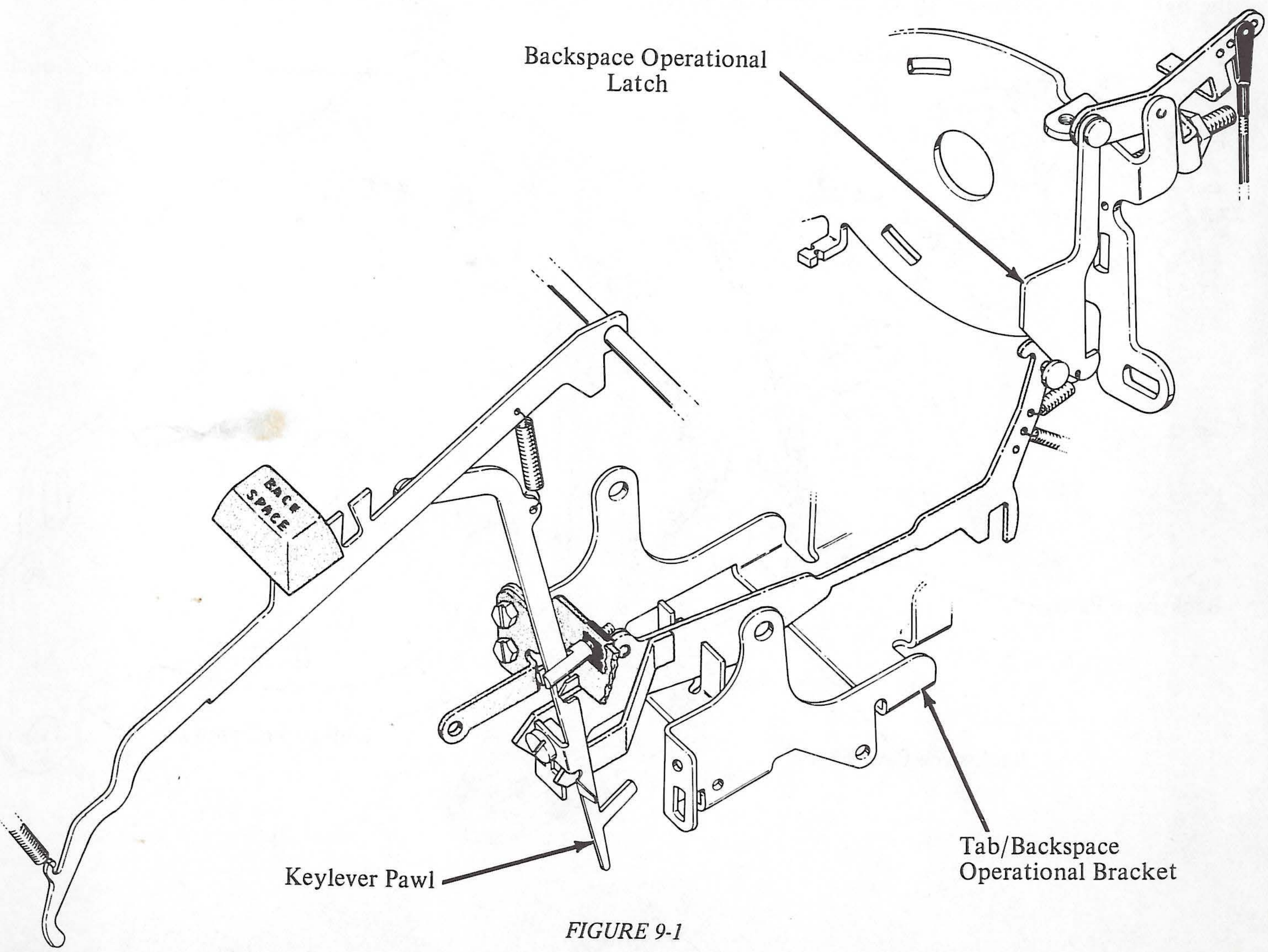


FIGURE 9-1

operation. This is because no escapement selection occurs during a homing operation which means that there is no set pin in the home position to be sensed by the pin set sensing device. In other words, if an operator should tab, print a character, and then depress the character backspace keybutton, the carrier would not backspace back to the tab position. Instead, the carrier would backspace right on through the tab position until it found a set pin. Of course, if a pin just happens to be set in the home position, then the carrier will come to rest at the correct point.

Since a homing operation also occurs during a carrier return operation, the carrier will not character backspace accurately back to the left hand margin unless there just happens to be a pin set in the home position. Usually the carrier will backspace into the overbank until it finds a set pin. Because the maximum distance between set pins, under normal conditions, is 9 units and the amount of overbank motion of the margin rack is nine units in the 1/72 pitch, the carrier should always find a set pin within the overbank motion. This means that if a character backspace operation is initiated either at the left margin or to the right of the left hand margin, the carrier can never backspace far enough into the overbank to bind off. Also, once the carrier moves into the overbank both the unit backspace and character backspace keylevers are interlocked so that they cannot be actuated again.

Now that you have a general idea of how the unit backspace and character backspace operate, let's examine each of these mechanisms in detail. We will divide the backspace mechanism into five sections; unit backspace, character backspace, backspace to print interlock, print to backspace interlock, and backspace overbank interlock.

1. Unit Backspace

Depressing the unit backspace keylever causes the keylever pawl to trip the backspace interposer. As the interposer slides to the rear, it pushes the backspace operational latch under the cam follower and releases the tab/backspace cam. The cam rotates causing a downward pull to be produced on the backspace operation latch. The latch is mounted on the forward end of the backspace operational latch arm as shown in Figure 9-1. As the latch arm is pulled down in the front, a pull is produced on the backspace operating

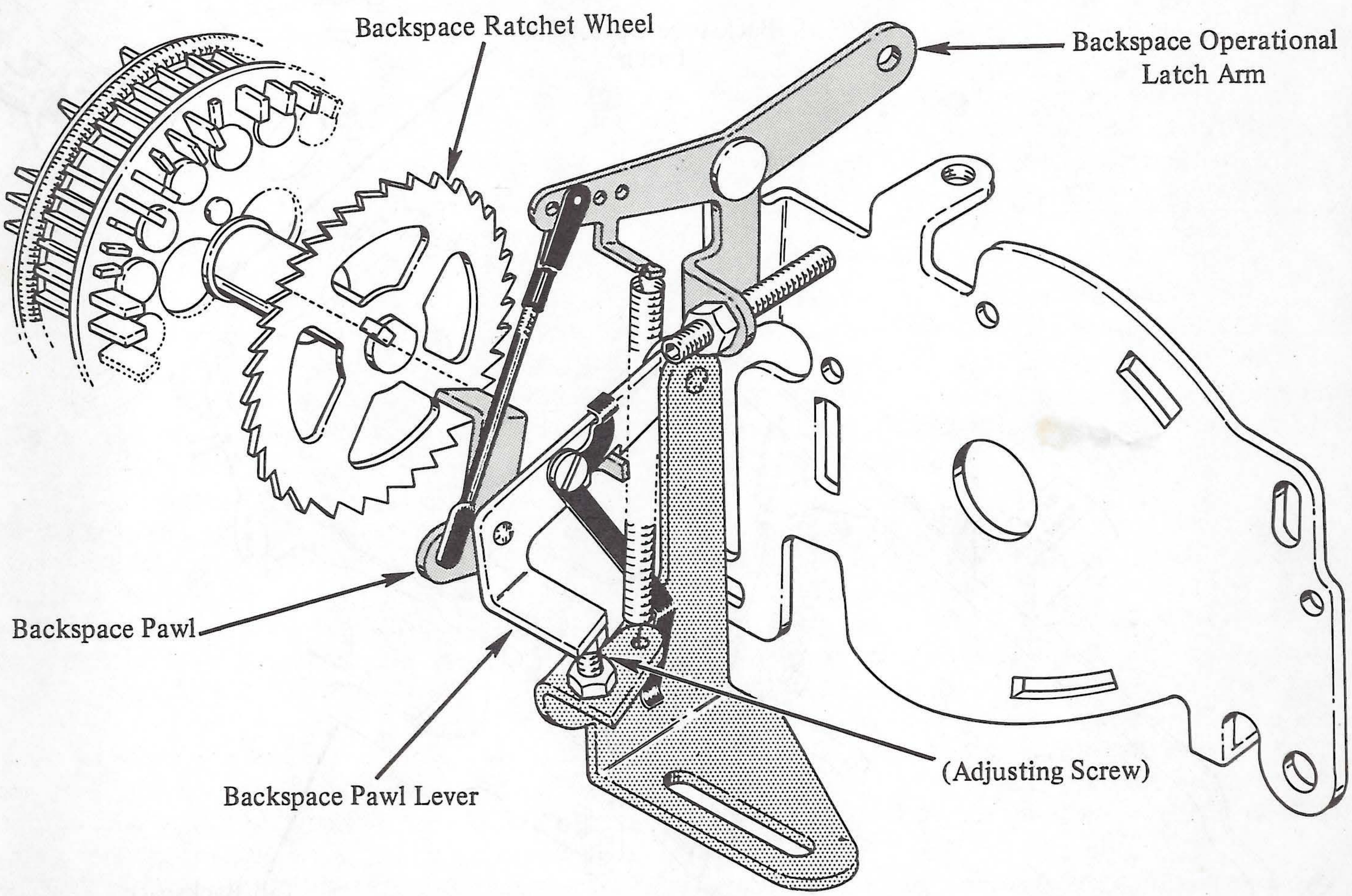


FIGURE 9-2

link, which is fastened to one of four holes in the rear of the latch arm. The four holes are for adjustment purposes.

The pull on the link is used to drive the backspace ratchet wheel clockwise to achieve the backspace operation. The ratchet wheel which contains 60 teeth, one corresponding to each pin in the pinwheel, is mounted on the left hand end of the pinwheel shaft (Fig. 9-2). A key and set screw secures it in position. The lower end of the operating link connects to the backspace pawl which mounts and pivots on a rivet on the backspace pawl lever. The pawl lever mounts and pivots on a rivet on the backspace pawl lever mounting bracket. This bracket is anchored to the machine powerframe by two screws.

When the latch arm begins to pull on the operating link, the backspace pawl rotates top to the front about its mounting rivet until it fully engages a tooth in the ratchet. This action is provided by the black lead spring fastened to the side of the pawl lever. It produces a slight drag on the pawl lever. Therefore, the initial pull on the operating link will rotate the backspace pawl into the backspace ratchet. As the pawl bottoms out on the ratchet the continued pull on the link overcomes the drag felt on the pawl lever, and the pawl and pawl lever move as one. Since the pawl is not free to rotate further the pivot point moves to the pawl lever mounting rivet as the pawl and pawl lever continue to rise. This drives the ratchet wheel in a clockwise direction resulting in a backspace operation.

The pull on the link drives the ratchet far enough for the holding pawl to be cammed over one escapement pin in the pinwheel. Since there are 60 teeth on the ratchet the backspace pawl must drive the ratchet slightly more than one tooth to assure that the backspace holding pawl will drop in behind the next pin.

A large extension spring anchored to the pawl lever mounting bracket loads the operational latch arm back to rest. Just before the latch arm reaches its rest position as it is restoring, the pawl lever is stopped by an adjusting screw on the pawl lever mounting bracket. With the pawl lever stopped, the remaining motion of the latch arm disengages the pawl from the ratchet wheel. The large adjusting screw in the latch arm, that contacts the rear face of the back plate, controls the rest position of the latch arm (Fig. 9-2).

The unit backspace keylever is a repeat/non-repeat keylever similar to that of a "Selectric" Typewriter. The lower edge of an adjustable plate, fastened to the bottom of the keylever pawl, trips the backspace interposer when the keylever is depressed to the non-repeat position. When the keylever is depressed all the way to the repeat position, the repeat action is produced by the second step on the adjustable plate (Fig. 9-3). The second step cams the interposer back down as it attempts to relatch on the keylever pawl guide.

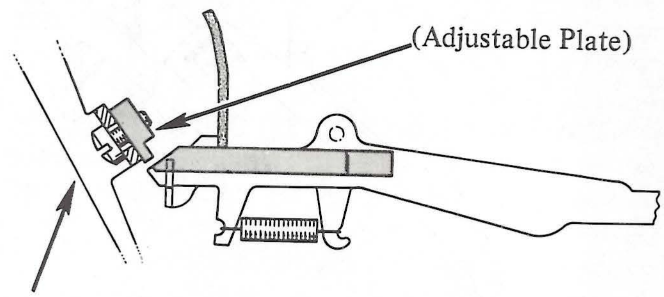


FIGURE 9-3

2. Character Backspace

The character backspace mechanism is divided into two areas; the keylever mechanism involved in latching the backspace interposer into a repeat mode and the pin set sensing mechanism which is located in the pinwheel box. Let's begin with the keylever mechanism.

Several actions must occur as the character backspace keylever is depressed. First, the downward motion of the keylever pawl must trip the backspace interposer. Second, it must produce a latching action that will keep the interposer in a repeat mode until a set pin is sensed in the pinwheel. Third, a disconnect action to the keylever pawl must occur so that if the operator should either hold the keylever depressed throughout the entire operation, or release it and then depress it again, there will not be any interference.

You will probably notice that the non-repeat operation of the unit backspace keylever is inhibited during a character backspace operation. This is not intentionally designed into the mechanism, but is only a by-product of the backspace overbank interlock which will be explained later.

When the machine is at rest the character backspace keylever pawl is positioned directly above the forward end of the character backspace latch carrier. This latch carrier mounts and pivots at the rear on the latch carrier shaft. The shaft is a small pin that extends across a U-shaped portion of the operational bracket. Two "C" clips secure it in place (Fig. 9-4).

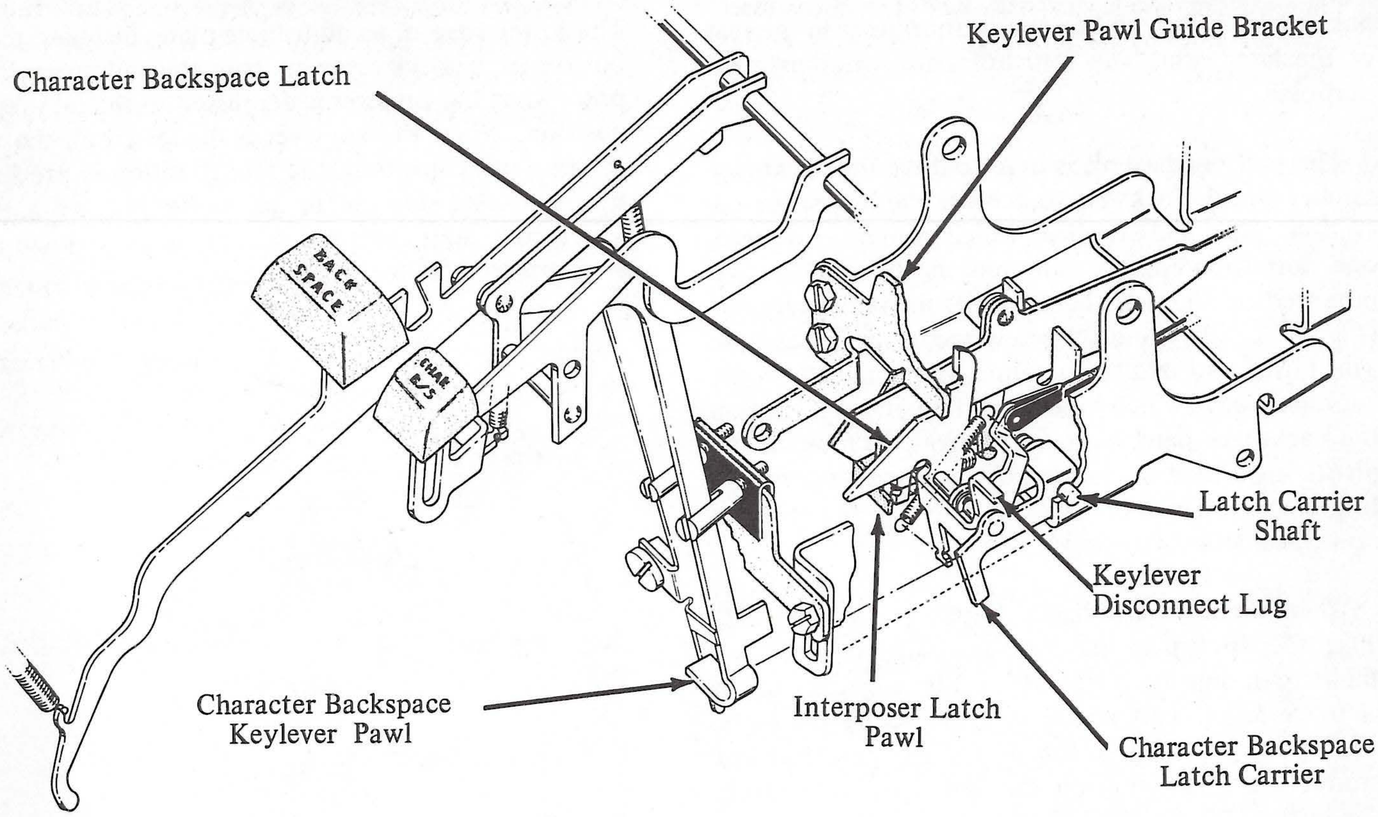


FIGURE 9-4

Mounted on the forward end of the latch carrier by a small shaft is the character backspace latch. An extension spring anchored to the left end of the latch carrier shaft fastens to a spring lug on the bottom side of the character backspace latch. This spring not only loads the latch top to the front about its pivot shaft but also provides a component of force to load the latch carrier top to the rear about its shaft (Fig. 9-4).

The clockwise loading of the latch carrier causes the latch front end to bear against the bottom edge of the keylever pawl guide bracket. The counter clockwise loading of the latch causes the latch to be also loaded against the rear face of the keylever pawl guide bracket (Fig. 9-5A). This illustration shows the latch and latch carrier in their rest position.

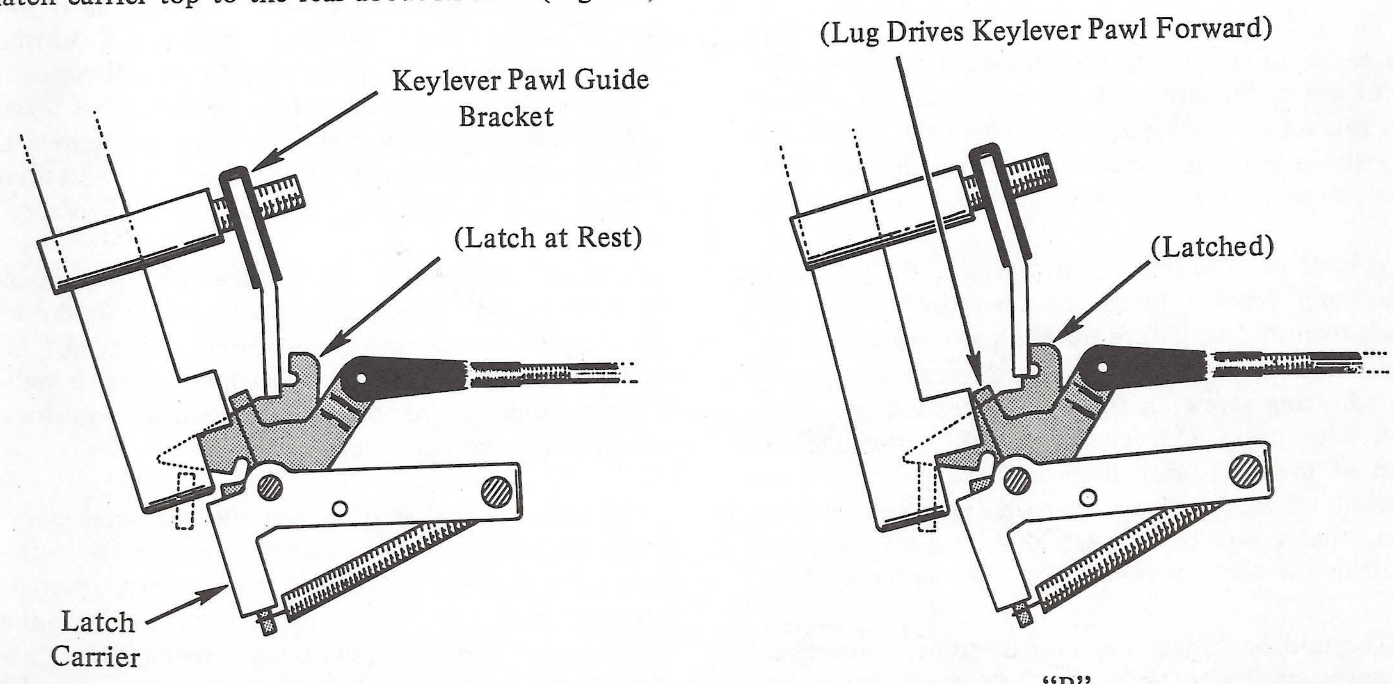


FIGURE 9-5

When the character backspace keylever is depressed its keylever pawl pushes down on the forward end of the latch carrier. As the latch carrier is driven top to the front it carries the latch down with it. When the latch moves down, its forward tip begins to drive the front end of the interposer latch pawl down. From Figure 9-4 you can see that the front end of the interposer latch pawl is formed at right angles and extends over beneath the forward tip of the character backspace latch. Once the character backspace latch begins to rotate top to the front into its latched position the latch pawl receives enough motion to cause the interposer to be released. This design produces a serial action. That is, the interposer cannot be tripped unless the character backspace latch latches.

Just as the character backspace latch rotates top to the front into its latched position, the keylever disconnect lug on the latch comes forward into the rearward protruding lug on the keylever pawl, camming the keylever pawl forward, disconnecting it from the latch carrier. This action prevents the keylever pawl from interfering with the restoring of the latch carrier if the operator happens to hold the keylever depressed while the latch and latch carrier are being restored.

When the character backspace latch pivots top to the front into its latched position it activates the pin sensing mechanism in the pinwheel box. This is accomplished through a link called the character K/O link. This link runs from the top of the character backspace latch to the bottom of the character backspace K/O arm (Fig. 9-6). The K/O arm mounts and pivots on the sensor mounting stud which fastens to the left side of the pinwheel mounting bracket. The function of the K/O arm is to slide the character backspace sensor into its sensing position and then, when a set pin is sensed by the sensor, to pick up the motion of the sensor and feed it back through the link to knock off the character backspace latch.

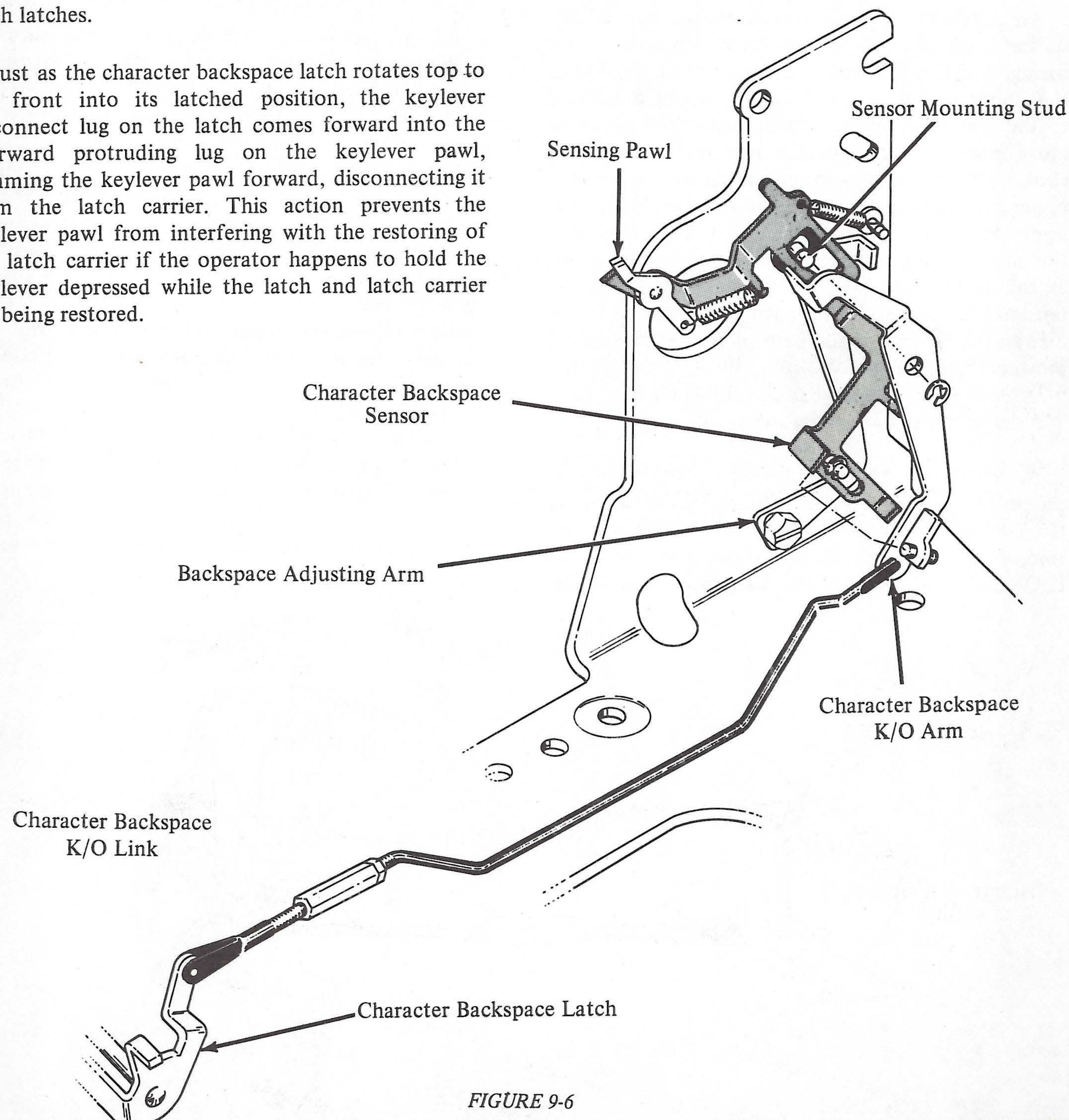


FIGURE 9-6

The character backspace sensor is mounted by two studs to the inner face of the pinwheel mounting bracket (to the left of the pinwheel). The mounting hole in the sensor for the lower stud is elongated (Fig. 9-6). This elongated hole permits the sensor to slide forward to position the tip of the character backspace pawl, which is mounted on the forward end of the sensor, into the path of the set pins in the pinwheel. The mounting hole for the upper stud is a large rectangular shaped window. This window not only allows the sensor to slide forward but also permits the forward end of the sensor to be driven counterclockwise by a set pin as the pinwheel rotates in the backspace direction.

An extension spring fastened to the top of the sensor loads the sensor into its rest position. This spring, which is fastened to the sensor just forward of the upper mounting stud loads the sensor down and to the rear. This spring tension causes the sensor to move downward and to the rear on its mounting studs. This places the lower mounting stud in the upper front position of its elongated hole and the upper stud shoulder in the most forward position in the large window. Since the pivot point for the sensor at this time is the lower mounting stud, the spring tension causes the sensing pawl to move top to the rear and down out of the path of the set pins in the pinwheel until driven forward by the K/O arm. Figure 9-7A shows the character backspace latch, K/O arm, and the sensor in their rest position.

As soon as the character backspace keylever is depressed far enough to allow the character backspace latch to pivot counterclockwise to its latched position, a pull will be produced on the front end of the K/O link (Fig. 9-7B). This pull on the link is produced by the latch spring. When the link is pulled forward it causes the K/O arm to pivot clockwise about the upper sensor mounting stud. As the bottom of the K/O arm swings forward the Nylok® adjusting screw, which is threaded into a small block at the bottom of the arm, drives the sensor forward on its elongated mounting hole. This causes the tip of the pawl, mounted on the forward end of the sensor, to move into the path of the set pins in the pinwheel. The backspace mechanism is now latched into a repeat mode and will remain in this mode until a set pin comes in contact with the pawl on the sensor. (Notice that the character backspace latch spring has to overcome the sensor spring in order to drive the sensor forward.)

As the backspace mechanism steps the pinwheel backwards in a repeat operation, the first set pin to contact and drive the pawl down will cause the repeat operation to stop. When the set pin drives the forward end of the sensor down as shown in Figure 9-7C, the sensor pivots top to the front about its lower mounting stud. This rotational motion is then used to produce the necessary pull on the K/O link to unlatch the character backspace latch. When the sensor is driven down at the front a tab on the forward end of the sensor pushes down on the formed lug on the upper end of the K/O arm. This causes the arm to pivot counterclockwise producing the pull on the link to unlatch the character backspace latch.

From Figure 9-7C, it is obvious that, as the sensor begins to drive the K/O arm top to the front the Nylok® screw can no longer hold the sensor in its forward position. A latch is needed to hold the sensor

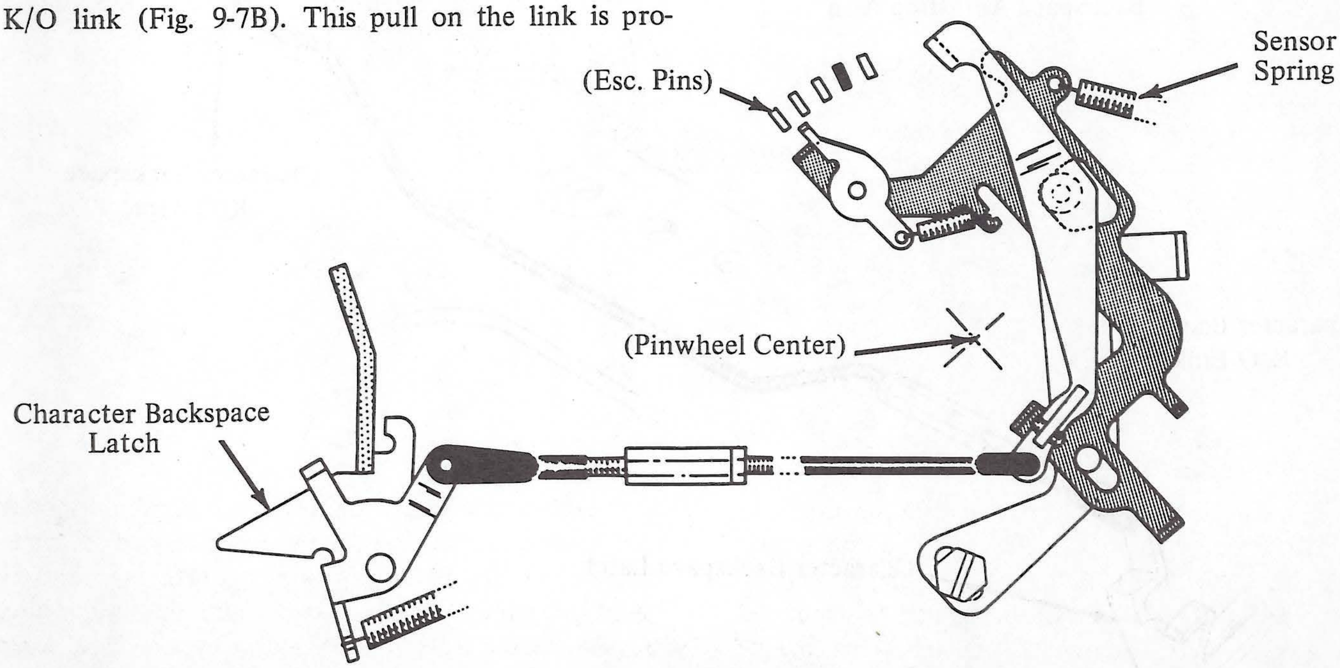


FIGURE 9-7A

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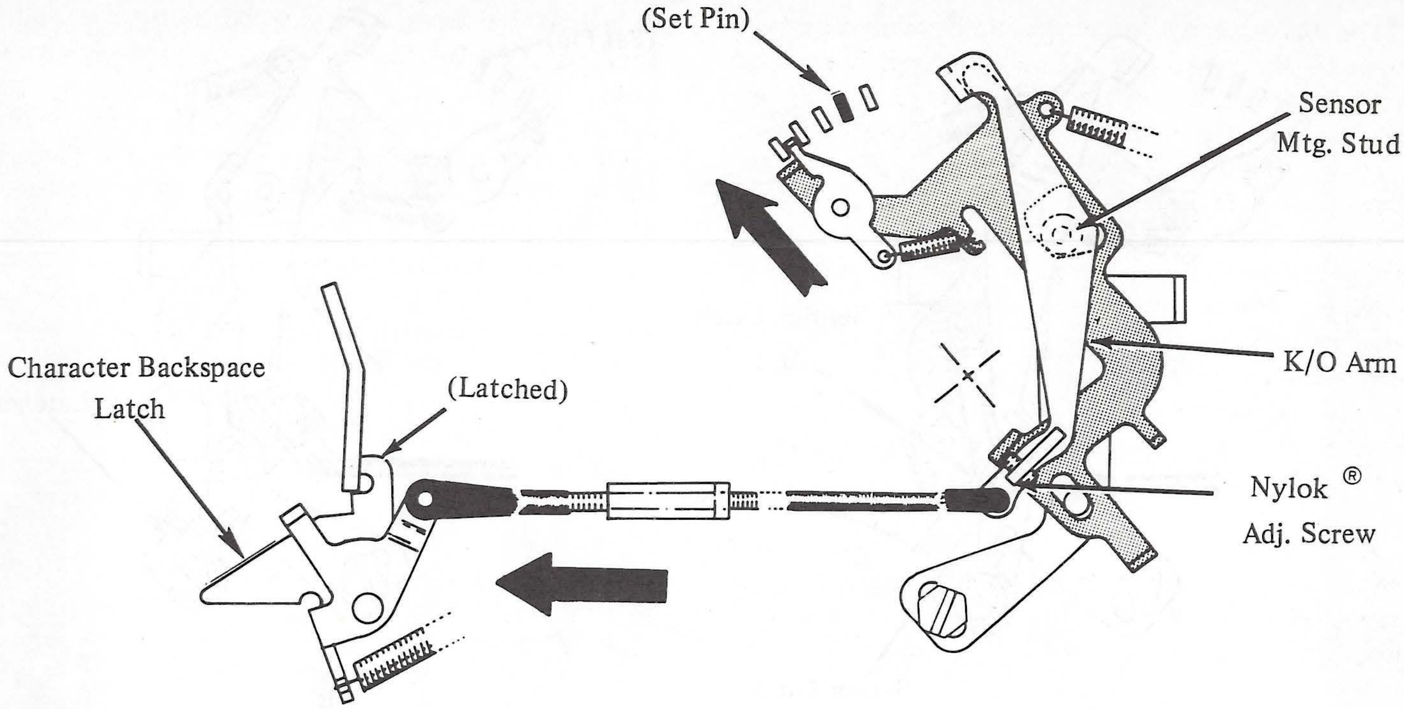

FIGURE 9-7B

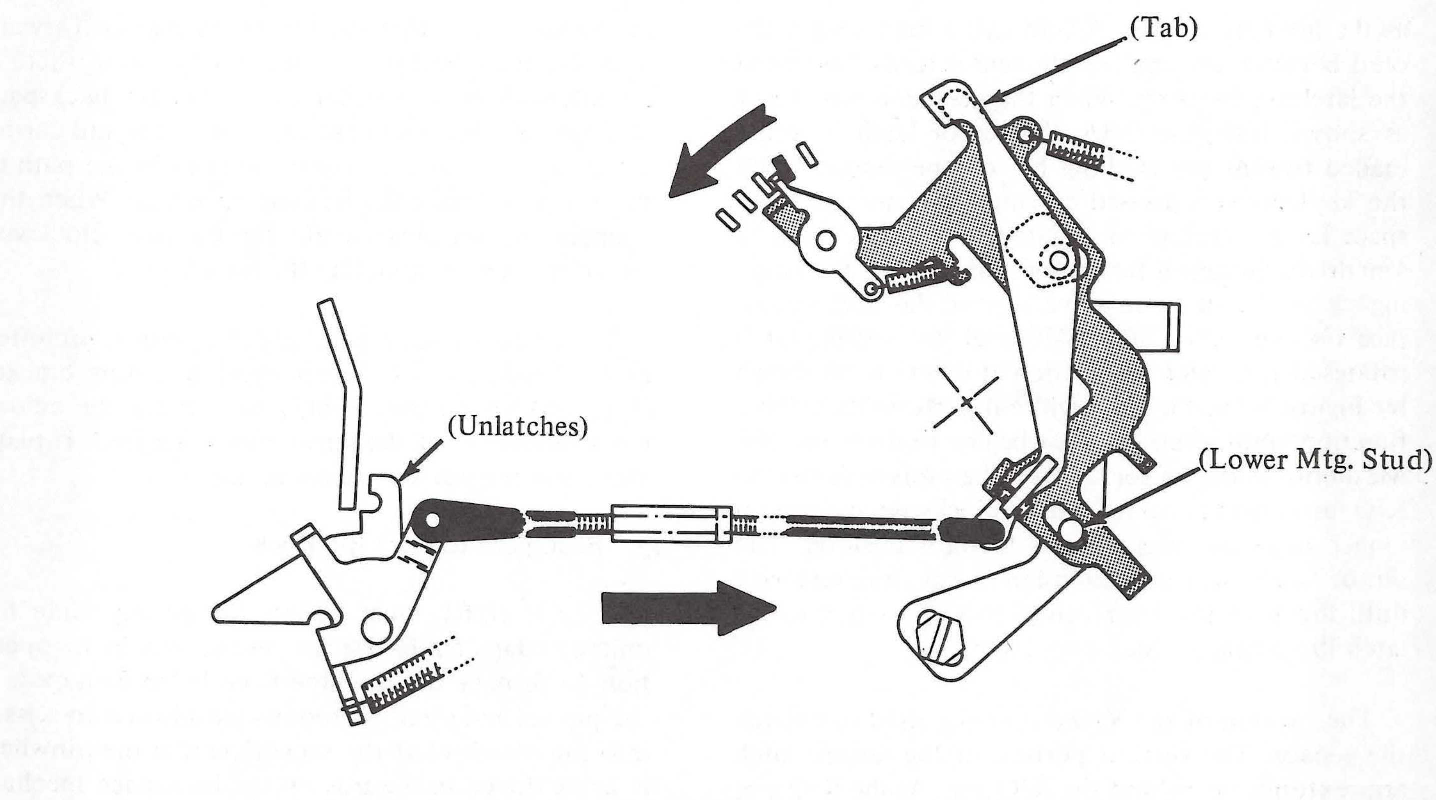

FIGURE 9-7C

forward once the sensor begins to rotate the K/O arm. This latch assures that the pawl on the sensor will remain in the path of the set pin long enough so that an adequate amount of motion will be produced to the K/O arm to unlatch the character backspace latch.

This latching action of the sensor is gained through the sensing latch arm which mounts and pivots on the same stud that mounts the rear of the sensor (Fig. 9-8A). A small adjustable plate, called the sensor latch, fastens to the bottom of this arm by a binding screw. The small notch in the corner of this plate functions

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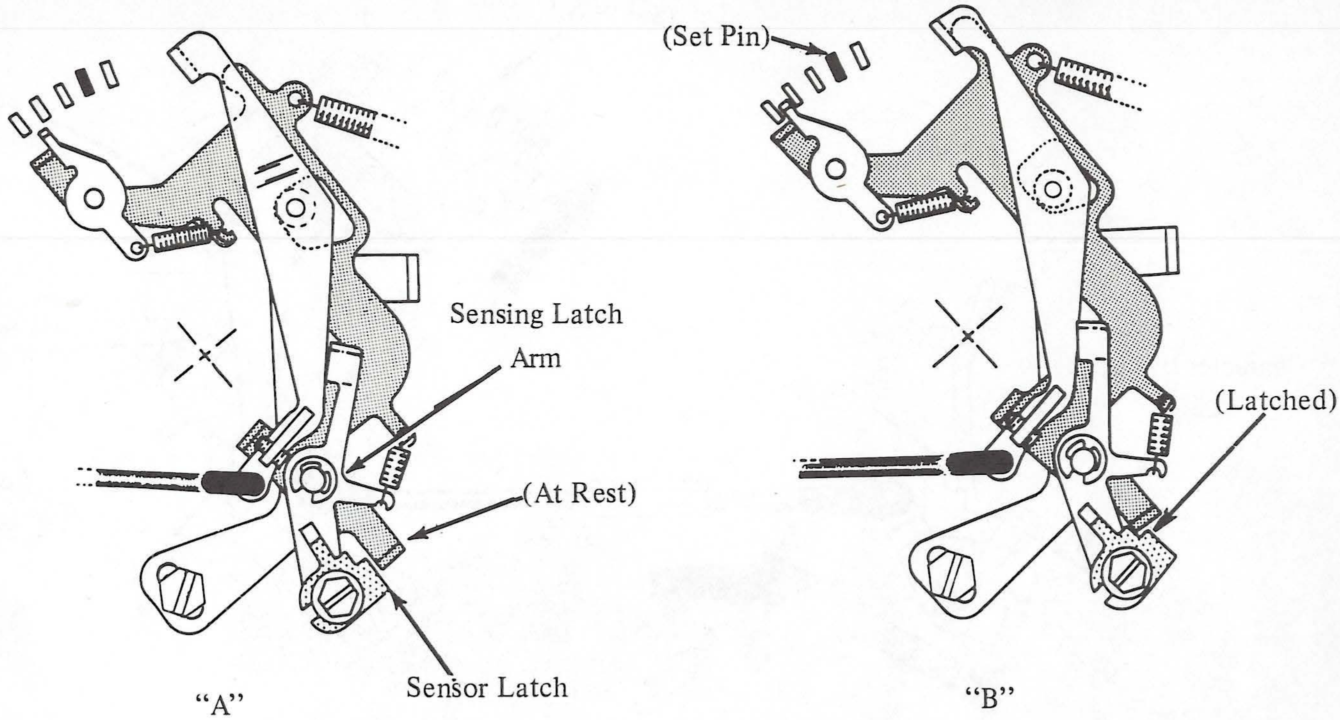


FIGURE 9-8

as the latching surface. A light extension spring anchored between the arm and the sensor loads the arm in the latching direction. When the mechanism is at rest as shown in Figure 9-8A, the sensor latch is spring loaded toward the latching lug on the sensor. When the keylever is depressed causing the character backspace latch to rotate to its latched position, the K/O arm drives the sensor far enough forward for the latching lug on the sensor to move beyond the latching surface on the sensor latch. Although the sensing latch rotates into its latching position at this time, as shown by Figure 9-8B, the latch will not perform its holding function until after a set pin begins to drive the forward end of the sensor down. When this happens the K/O arm starts to rotate counterclockwise and can no longer hold the sensor in its forward position. The sensor latch must now hold the sensor from restoring until the K/O arm has received enough motion to unlatch the character backspace latch.

The motion of the K/O arm is also used to unlatch the sensor. The vertical portion of the sensing latch arm extends up behind the K/O arm. As the K/O arm is being driven counterclockwise by the sensor, it drives the sensor latch arm clockwise causing the sensor latch to disengage from the latching lug on the sensor. This unlatching action does not occur until after the K/O arm has unlatched the character backspace latch.

The spring loaded pawl on the forward end of the sensor prevents damage from occurring if the pinwheel should happen to rotate in the escape direction at the same time that the sensor is actuated forward in a character backspace operation. Because there is no interlocking action between character backspace and tab, and between character backspace and carrier return, it is possible to place the pawl in the path of the set pins during the homing operation. When this happens the set pins merely flip the pawl clockwise out of the way, eliminating the interference.

The character backspace adjusting arm is mounted on the inside face of the pinwheel mounting bracket (Fig. 9-6). Its purpose is only to simplify the adjustment procedure of the sensor mounting stud. It plays no part in the pin sensing operation.

3. Backspace to Print Interlock

The cycle clutch must be interlocked any time the unit or character backspace mechanism in in operation to protect the machine from being damaged. If the pin set and clear interposers are allowed to scissor into the pinwheel at the same time that the pinwheel is being driven backwards by the backspace mechanism, damage can result.

Depressing either the unit or character backspace keylever causes the interlock bail to rotate to its interlocking position. The cycle clutch interlock pawl, mounted on the left end of the interlock bail, rotates into the path of the cycle clutch control lever to interlock the cycle clutch mechanism. The action here is exactly the same as that produced by the shift to print interlock and the carrier return to print interlock.

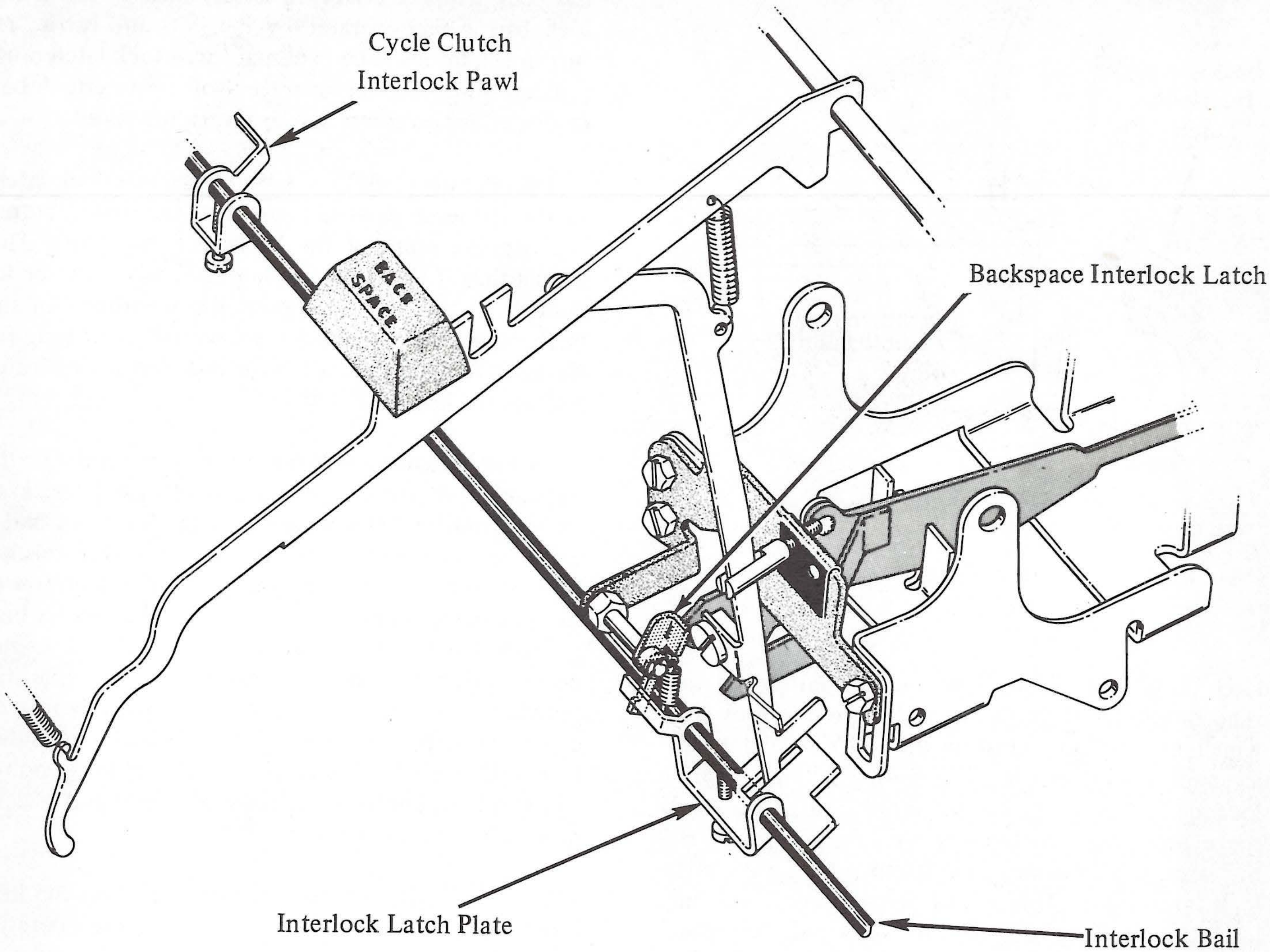


FIGURE 9-9

Therefore, we will only be concerned with describing how the depression of either keylever actuates the interlock bail. The interlock bail is spring loaded into its rest position (see shift mechanism).

A flat plate, called the interlock latch plate, mounts on the interlock bail directly beneath the unit backspace keylever pawl. The end of the keylever pawl projects through a slot in this plate (Fig. 9-9). A binding screw that tightens against a flat spot on the interlock bail secures this plate to the bail. When the unit backspace keylever is depressed the lug projecting from the rear edge of the keylever pawl drives the latch plate down causing the interlock bail to rotate into its interlocking position. This action is illustrated by Figures 9-10A and 9-10B.

Because the operator may release the unit backspace keylever before the backspace operation has completed, a latch is needed to hold the interlock

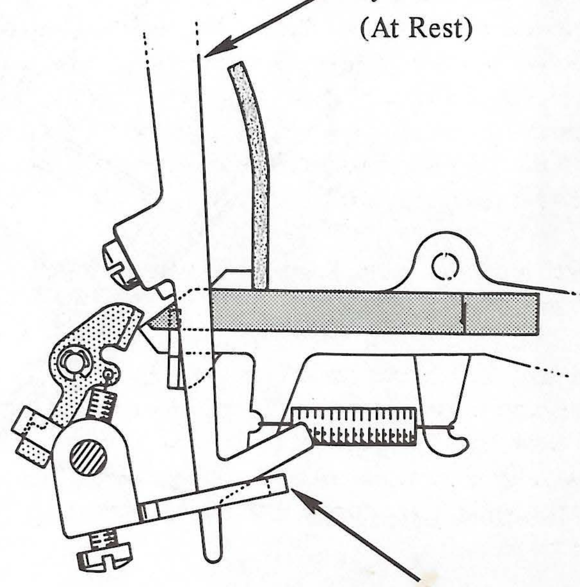


FIGURE 9-10A

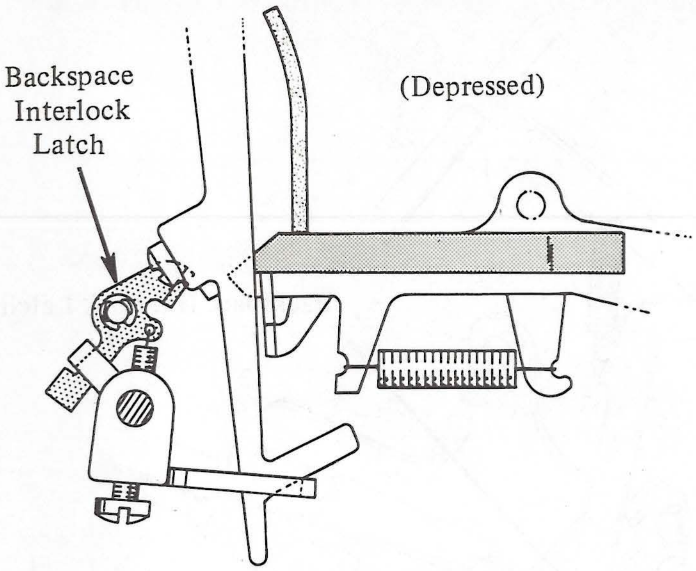


FIGURE 9-10B

latch plate in its active position. This latching action is accomplished through the backspace interlock latch which mounts on a stud on the left side of the keylever pawl guide bracket (Fig. 9-9). The latch is spring loaded clockwise against the front end of the backspace interposer. As long as the interposer is at rest the latch is held clear of the latching lug on the interlock latch plate. This means that the latch will only latch the interlock bail when the backspace interposer has been tripped. This is necessary because the interlock bail is also operated by the shift and carrier return mechanisms. The backspace interlock latch must not interfere with the operation of the interlock bail during either a shift or carrier return function.

The latching point of the backspace interlock latch, as the keylever pawl is depressed, is reached before the tripping point of the backspace interposer. This means that if the operator depresses the keylever far enough to trip the interposer, the overthrow of the latch plate beyond the latch allows sufficient time for the latch to engage regardless of how fast the operator releases the keylever.

As the backspace interposer is restored it drives the backspace interlock latch counterclockwise back to its rest position. This means that the interlock bail is unlatched just before the tab/backspace cam reaches its high point. Since the backspace driving action to the pinwheel finishes when the cam reaches its high point and the chopper bar scissoring action does not occur until the second quarter of a print cycle, the pinwheel has sufficient time to settle down before escapement selection occurs. Thus, the backspace interlock latch holds the interlock bail latched long enough to provide full protection to the pinwheel and escapement selection mechanism.

During a unit backspace repeat operation the keylever pawl, which is held depressed by the operator,

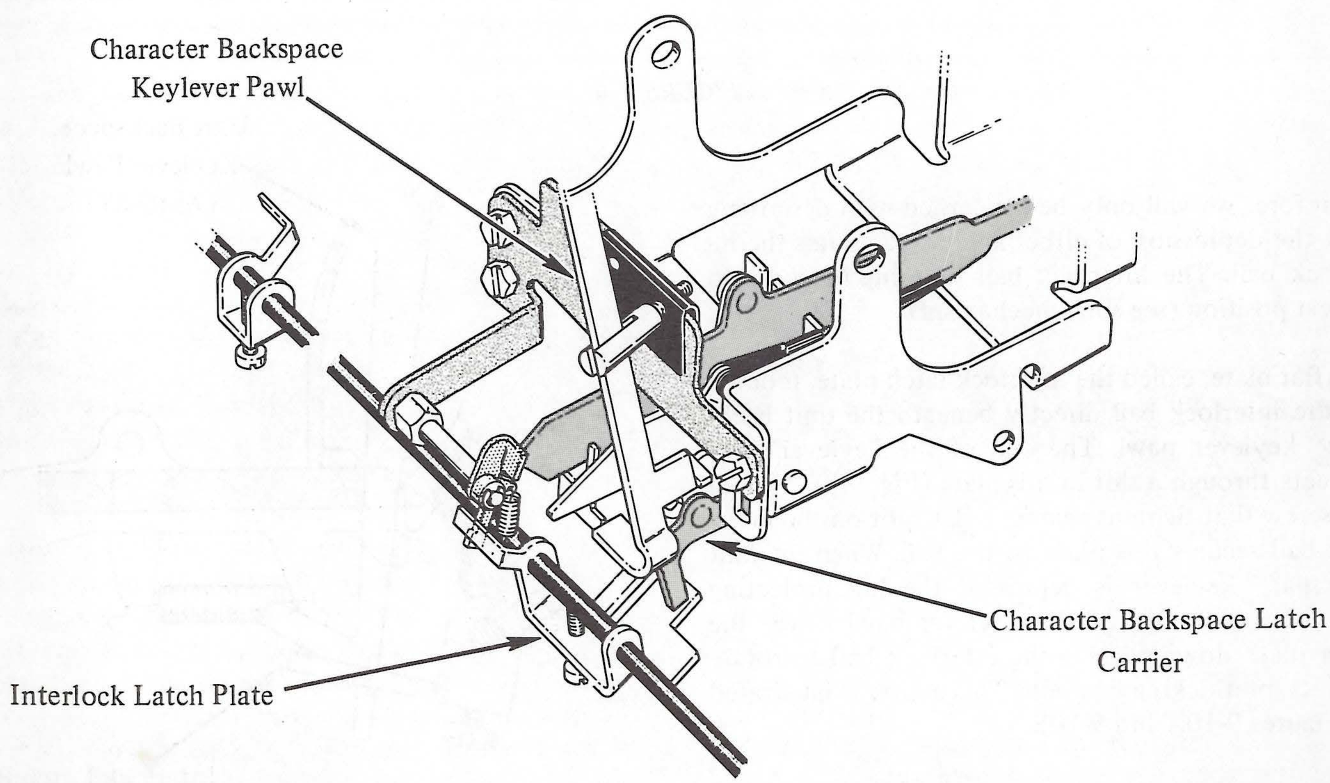
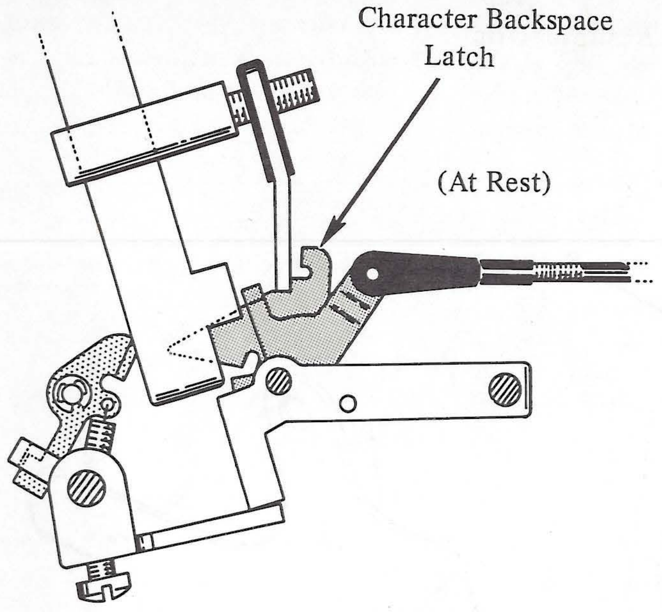


FIGURE 9-11



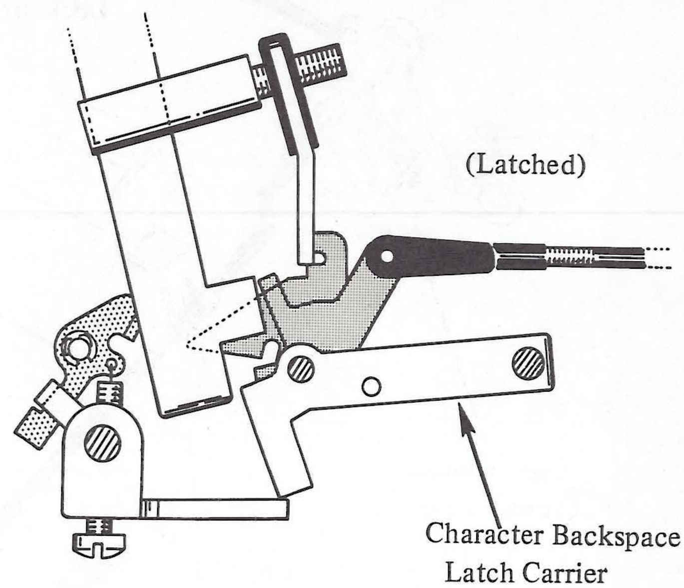


FIGURE 9-12

holds the interlock bail in its interlocking position. The backspace interlock latch is ineffective during this operation.

Interlocking the cycle clutch during a character backspace operation is achieved in a similar manner as during a unit backspace operation. When the unit and character backspace keylevers are at rest, the rest position of the interlock bail, which is spring loaded top to the front, is controlled by an extension on the front of the character backspace latch carrier. The top surface of the interlock latch plate is loaded against this extension (Fig. 9-11). Ultimately, the spring loading of the bail is limited by the character backspace latch bearing against the bottom edge of the keylever pawl guide plate.

When the character backspace keylever is depressed the keylever pawl drives the forward end of the latch carrier down until the character backspace latch swings into its latched position. This is illustrated by Figures 9-12A and 9-12B. When the latch carrier is pushed down it drives the interlock latch plate down causing the bail to rotate to its interlocking position. Since the character backspace latch holds the latch carrier down until a set pin is sensed in the pinwheel, the interlock bail remains in its interlocking position for the entire character backspace operation. It is not restored until the character backspace latch is knocked off which is just before the tab/backspace cam reaches its high point on the last backspace cycle. The backspace interlock latch remains ineffective throughout a character backspace operation.

4. Print to Backspace Interlock

Both the unit and character backspace mechanisms must be interlocked any time the machine is in a print cycle to protect the machine from being damaged. If the backspace mechanism were allowed to drive the pinwheel backwards at the same time that the pin set and clear interposers are scissoring into the pinwheel to perform escapement selection, damage could result.

Whenever the cycle clutch is released the cycle clutch control lever swings into the path of the lug on the cycle clutch interlock pawl, thereby blocking the rotation of the interlock bail. This blocking action works effectively in producing a print to carrier return mechanism because of the elasticity that exists in the carrier return keylever linkage. If the operator should depress the carrier return keybutton with excessive force when the interlock bail is blocked from rotating, the keylever linkage will flex allowing the keylever to bottom in the front guide comb without tripping off the interposer.

This same interlocking action, which is present in the unit and character backspace mechanism, doesn't work as effectively as in the carrier return mechanism because of the lack of elasticity in the keylevers. If an operator should depress heavily on either keybutton, she can cause the cycle clutch interlock pawl to slip on the interlock bail. For this reason a latch has been added to hold the interlock latch plate in its rest position whenever the cycle clutch is released. If the operator attempts to depress either the unit or character

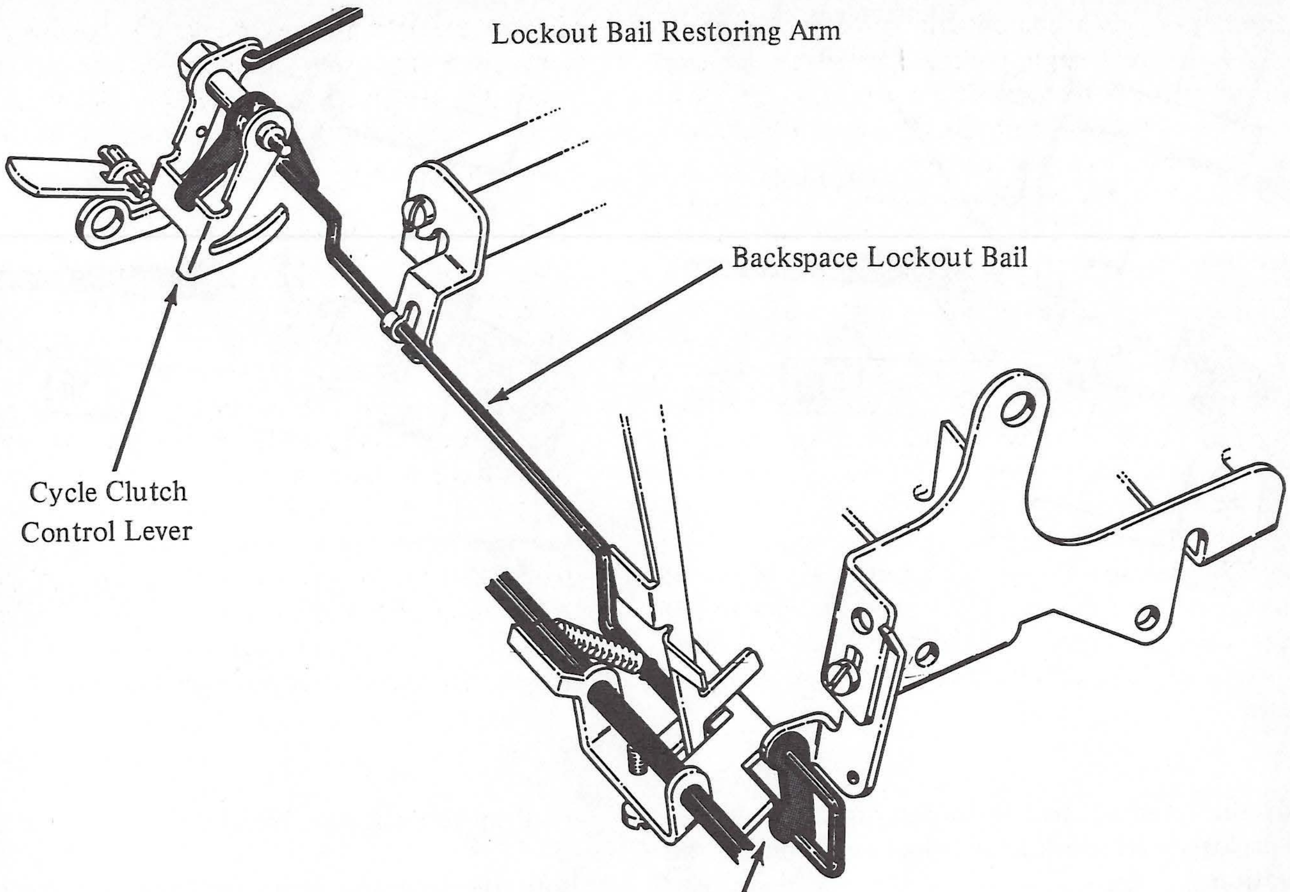


FIGURE 9-13

backspace keylever while the plate is latched a positive blocking action will be felt.

A bail, called the backspace lockout bail, extends from the cycle clutch release mechanism over to the tab/backspace operational bracket. Its function is to pick up the release motion of the cycle clutch control lever and carry it to the lockout latch (Fig. 9-13). The left hand end of the lockout bail is supported by a bracket fastened to the machine powerframe; the right end by a bracket on the tab/backspace operational bracket. Retaining clips hold the bail laterally in position.

The lockout latch, which mounts on the right hand end of the bail as shown in Figure 9-13, is controlled directly by the bail. An extension spring anchored to the interlock bail, loads the lockout bail clockwise towards its latching position. When the cycle clutch is latched at rest the lockout bail restoring arm, which mounts and pivots on the cycle clutch control lever pivot stud, holds the lockout bail in its rest position. When the cycle clutch is released the control lever swings toward the rear allowing the lockout bail to rotate clockwise into its latching position. The bail remains in this position until the cycle clutch restoring cam on the cycle shaft drives the control lever back to its latched position. Since the restoring action of the cycle clutch doesn't occur until after the chopper bar scissoring action has completed, restoration of the lockout latch before the print cycle has completed is permissible. Protection of the escapement mechanism is needed only during the chopper bar action.

5. Backspace Overbank Interlock

The purpose of the backspace overbank interlock is to limit how far the carrier can be backspaced into the left hand margin. It limits the unit backspace to four cycles and the character backspace to a maximum of nine cycles. Since the amount of overbank is equivalent to nine units in the 1/72" pitch, the carrier, under normal circumstances, should never backspace beyond the range of the margin rack overbank motion. If allowed to, parts damage could result. You can imagine what would happen without this interlocking action during a character backspace operation. If the carrier were allowed to reach the end of an overbank before a set pin could be sensed in the pinwheel, the backspace mechanism would remain in a repeat mode hammering the carrier against the left margin until breakage occurred.

Interlocking is accomplished by using the motion of the left hand margin rack, as it is driven into overbank, to pivot both the unit and character backspace keylever pawls forward into inoperative positions. One unit of overbank motion produces enough motion to pivot the character backspace keylever pawl to an inoperative position. The unit backspace keylever becomes inoperative with four units of overbank motion.

The same arm that picks up the margin rack motion for the unlatching of the carrier return interlock latch is used to operate the backspace overbank interlock. This arm is called the margin pickup arm (Fig. 9-14). Mounted on the same pivot stud as the pickup arm is a smaller arm called the margin pickup arm follower. A heavy extension spring, anchored between the two arms, loads the follower arm against the pickup arm. This causes the follower arm to operate with the pickup arm as the margin rack pulls the top of the pickup arm to the left into overbank. The follower arm rotates counterclockwise with the pickup arm until it is limited by the end of the slot in the pickup arm guide. From then on, for the remainder of the overbank motion, the pickup arm operates alone.

The motion produced at the bottom of the pickup arm follower is carried via a link to a small bellcrank that mounts on the inside of the keyboard sideframe directly behind the character backspace keylever pawl (Fig. 9-14). When a pull is produced on the link the bellcrank pivots the character backspace keylever pawl and the unit backspace keylever pawl forward into inoperative positions. A small tab on the forward edge of the unit backspace keylever pawl extends across the front edge of the character backspace keylever pawl. This tab, which is formable, connects the pivoting motion of the character backspace keylever pawl to the unit backspace keylever pawl. Because of this tab, only one keylever pawl spring is used to load the

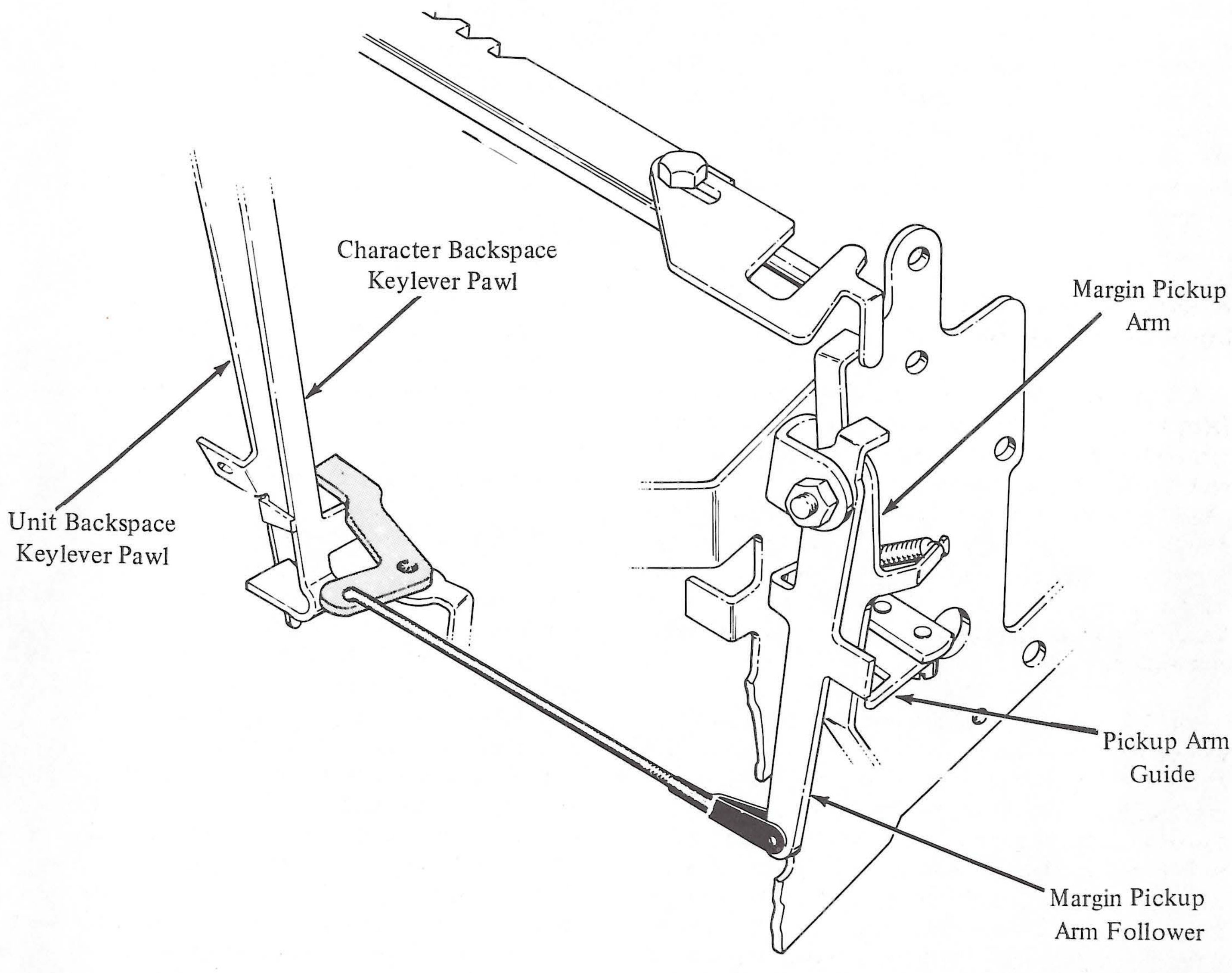


FIGURE 9-14

keylever pawls into their operative position. Also, this same spring loads the margin pickup arm all the way back to its rest position.

6. Miscellaneous

The question may arise: "What will happen if an operator depresses the unit or character backspace during either a tab or carrier return operation?" In both cases the only interference that will occur will be in the homing of the leadscrew. If the unit backspace is operated during a homing operation, the leadscrew will perform its homing operation until stopped by the backspace pawl, backspace, and then resume its homing operation. In this situation homing may be accurate or inaccurate depending on whether the backspace cycle finishes before or after the homing stop unlatches the homing pawl.

If the character backspace mechanism is tripped during a homing operation the leadscrew will home, backspace, resume homing, backspace, resume homing, etc. until the homing pawl is reached. At this point the homing pawl is unlatched and the holding pawl is dropped back into the pinwheel. The character backspace will now drive the pinwheel backwards until a set pin is sensed. In this instance homing will be inaccurate.

SPACEBAR

A spacebar function on the "Selectric" Composer is developed from a normal print cycle. Depressing the spacebar merely drives an interposer down into the path of the filter shaft tripping the cycle clutch exactly the same as during a letter key operation. When the filter shaft drives this spacebar interposer forward, which is located in position 44, a zero tilt/zero rotate/ no-print selection is produced. Thus, a spacing operation is attained. The action produced is exactly the same as that produced by depressing the "s" letter key while holding the no-print keybutton down.

Because the spacebar interposer operates in the selector compensator tube the same as all of the character interposers, the spacebar receives the same interlocking and stroke storage characteristics as the letter keylevers. On the "Selectric" Composer a "beat the spacebar" problem does not exist.

The mechanism involved in the selection of the escapement value for a spacebar is explained in the Justification section. This section only deals with the operation from the spacebar through to the escapement selection mechanism.

The mounting of the spacebar is exactly the same as on the standard "Selectric" Typewriter. The spacebar mounts on two arms of the spacebar shaft and is supported by a guide link running from the bottom of the stem to a support bracket (Fig. 10-1). A cushioning sleeve on the spacebar stem contacts the underside of the shaft when the spacebar is at rest. This functions as the upstop.

The spacebar repeat/nonrepeat action comes from the spacebar repeat spring which is mounted directly below the spacebar stem on the spacebar support bracket. The repeat spring is held in a preloaded state by means of the repeat spring bracket (Fig. 10-1). During a nonrepeat spacebar, the downward travel of the spacebar stem is stopped by the repeat spring. To reach the repeat position the operator applies heavier pressure overcoming the repeat spring. The spacebar may then be depressed until the spacebar stem is limited by the adjustable bracket on the keylever guard called the spacebar downstop.

Depressing the spacebar rotates the spacebar shaft which, in turn, through the spacebar cam set-screwed on the right end of the shaft, imparts a lifting action on the forward end of the spacebar keylever. This

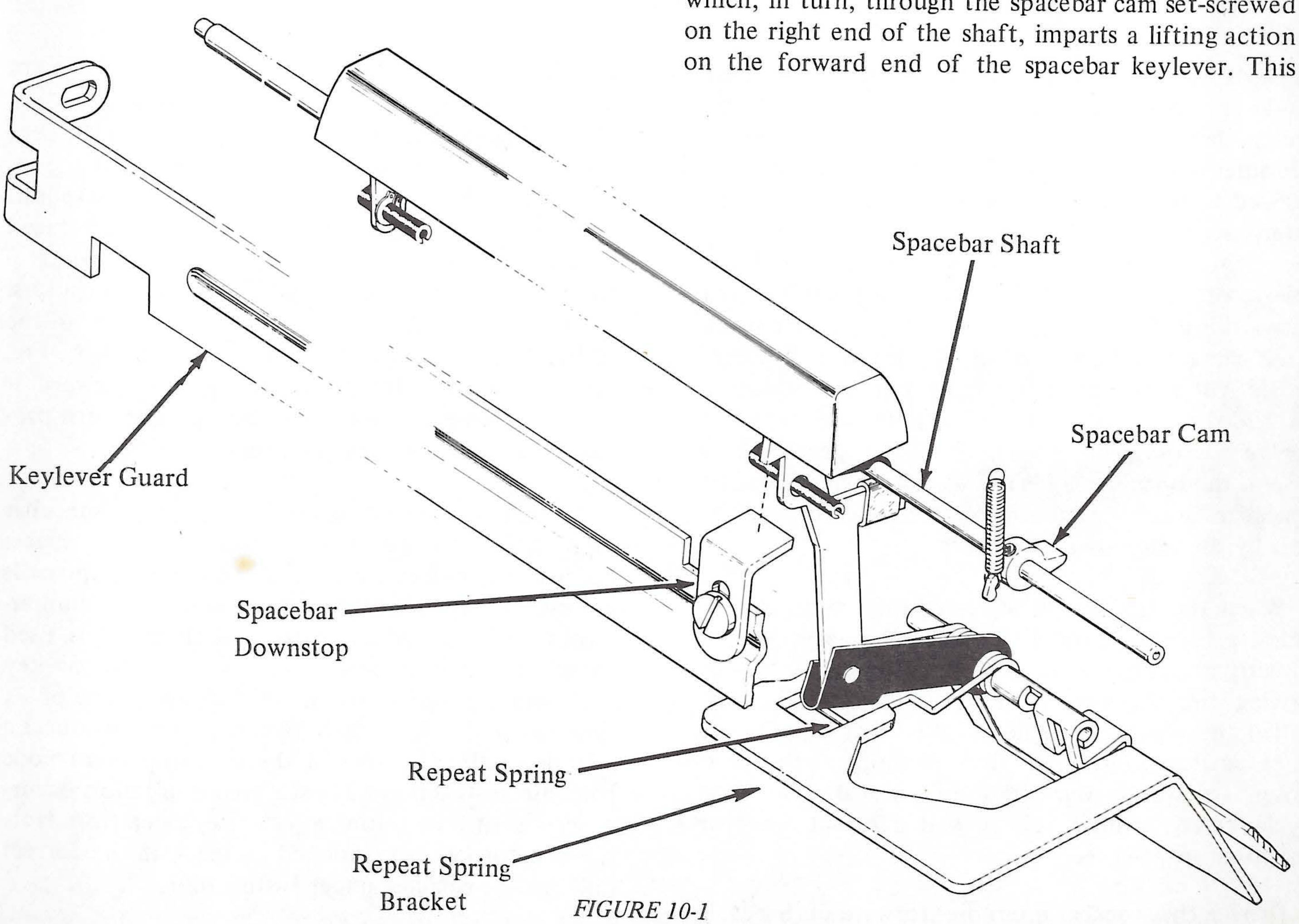


FIGURE 10-1

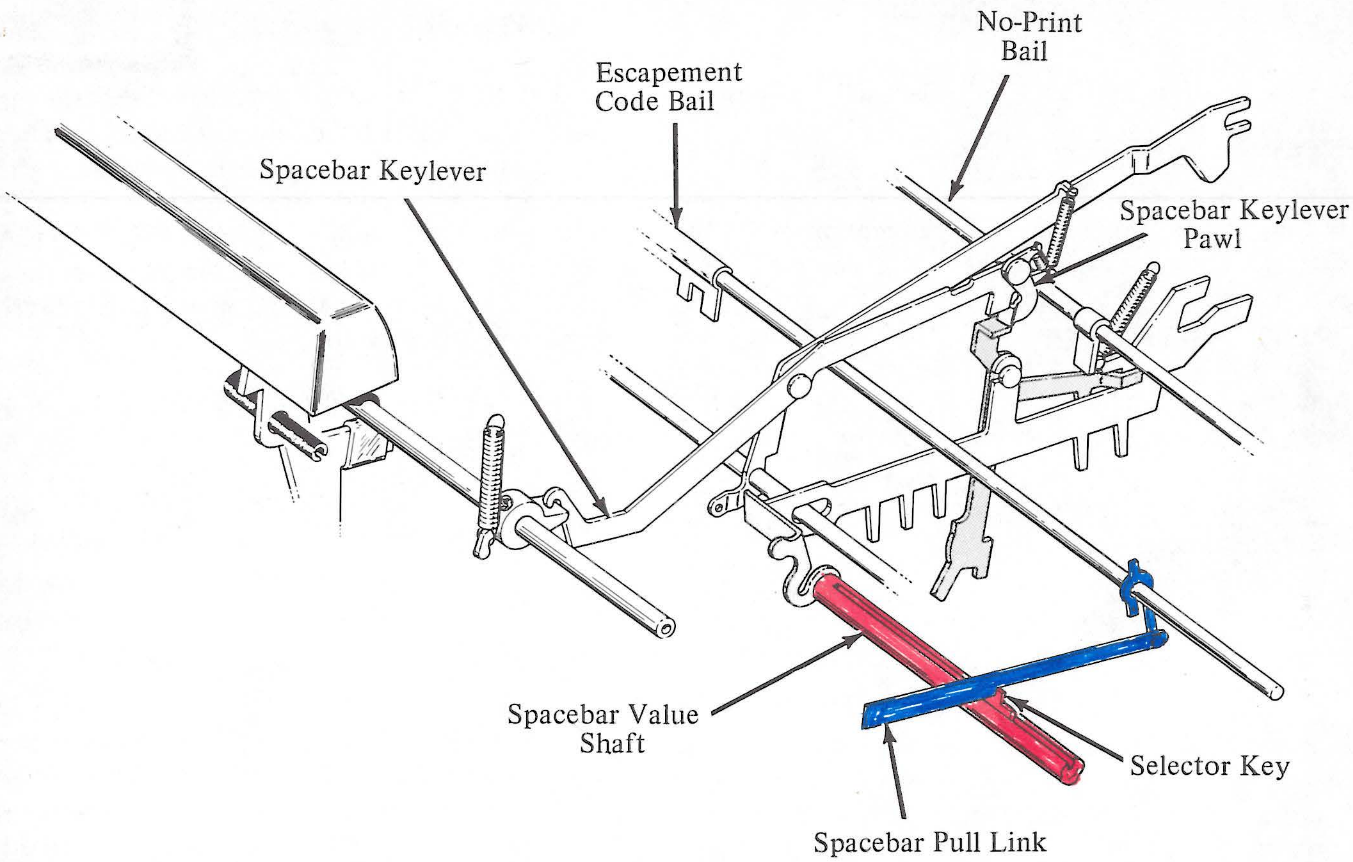


FIGURE 10-2

keylever, which mounts and pivots on the spacebar keylever support, has a pawl mounted at the rear directly above the interposer latch pawl on the spacebar interposer (Fig. 10-1). When the spacebar is depressed to its non-repeat position this pawl drives the interposer latch pawl down causing the interposer to move into the path of the filter shaft along with the release of the cycle clutch. As the interposer is driven forward by the filter shaft it carries the interposer latch pawl out from beneath the spacebar keylever pawl. When the interposer latch pawl becomes unlatched the interposer is then free to restore up and to the rear without interference from the spacebar keylever if the operator holds the spacebar depressed. The spacebar keylever pawl is merely deflected toward the rear by the interposer latch pawl.

When the spacebar is depressed into its repeat position a broad lug on the spacebar keylever, located directly above the keylever pawl, performs the task of driving the interposer latch pawl down. This lug, called the repeat lug, is designed so that it keeps the latch pawl and interposer from restoring as the interposer is driven forward by the filter shaft. Thus, the cycle clutch cannot relatch and a repeat spacebar function is achieved.

Driving the spacebar interposer forward during each spacebar cycle produces the required typing element selection, velocity selection, and escapement selection. The typing element selection, which is a zero tilt/zero rotate character, is produced by the coding of the selector lugs located along the bottom of the interposer. The velocity selection, which is no-print, is produced through the no-print code bail. This bail mounts across the rear of the keyboard above the interposers. A small tab on this bail projects down in front of the spring anchor lug on the spacebar interposer (Fig. 10-2). When the interposer is powered forward it drives the no-print bail clockwise which in turn produces a no-print velocity selection.

A small arm riveted to the left end of the spacebar value shaft rests against the forward tip of the spacebar interposer (Fig. 10-2). Each time the interposer is powered forward it causes the shaft to pivot counterclockwise. This motion of the value shaft is then used to make the escapement selection. A selector key anchored in a slot of the value shaft drives one of six spacebar pull links forward, which in turn, produces a selection action to one of the six escapement code bails. From this point an escapement selection occurs exactly as it does during a letter key operation. How the selector key is positioned in line with the correct pull link is explained under Justification.

MULTIPLE INDEX SYSTEM

The index system on the "Selectric" Composer is similar to that of the "Selectric" Typewriter in several areas. An indexing operation can be obtained by depressing either the carrier return keylever or the index keylever. The functional operation of these two keylevers on down through the operational area is almost the same as the "Selectric" Typewriter. The cam, cam follower, multiplying lever, and index link operation are exactly the same as on the base machine.

The major difference between the "Selectric" Composer and the "Selectric" Typewriter index mechanism is in the area of the platen ratchet feed mechanism. The "Selectric" Composer has a platen feed mechanism that is designed to feed the platen in increments which are compatible with the printing industry's point system. The mechanism is capable of producing 16 different line space selections. These selections range from a minimum of 5 points to a maximum of 20 points.

A point in the U. S. printing industry represents .013837 inch or approximately 1/72 of an inch. The point is a standard, which permits various sizes of type bodies to bear a fixed and simple relationship to one another. The point system is based upon a pica, which is approximately 1/6 of an inch. There are 12 points per pica or approximately 72 points to an inch.

By rotating the leading dial, which is located at the right hand end of the platen, the operator can choose any one of the 16 different line space values. Once she has set the dial on the desired value, the index mechanism will then produce that value each time the index mechanism is actuated. The operator chooses the indexing value according to the type style she is using. Printed on the cap of every typing element will be the point size of the type. From this the operator determines the leading. Leading is a printer's term which means the added space between lines of type.

1. Planetary System

Feeding the platen in point increments is achieved through two ratchets located on the right hand end of the platen. These two ratchets are tied together by a planetary gear system. This planetary system performs as a motion reduction device between the two ratchets and the platen. This planetary system in conjunction with the two ratchets produces the sixteen different line space selections. The left hand ratchet is called the low ratio ratchet while the right hand ratchet is called the high ratio ratchet (Fig. 11-1).

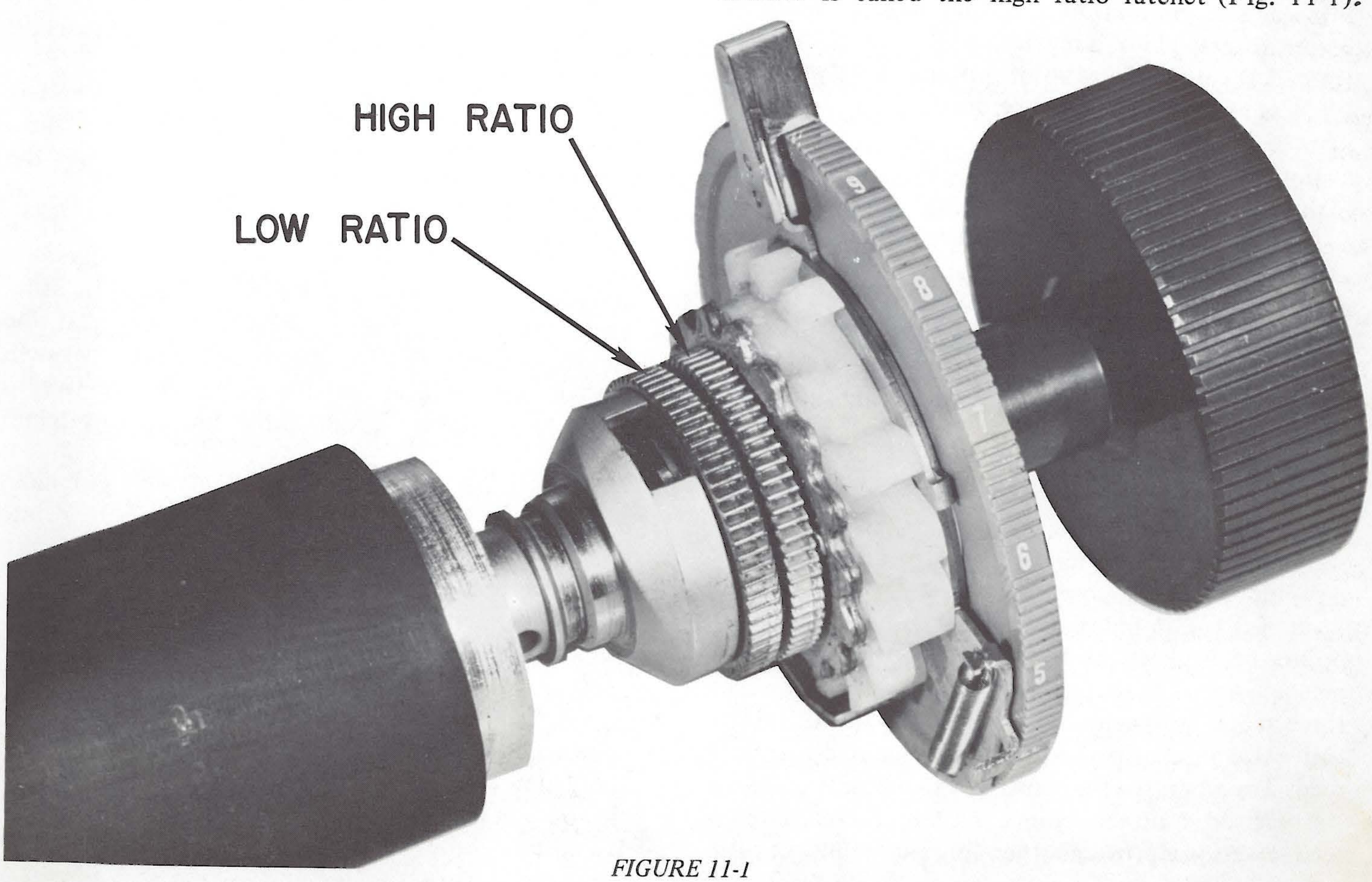
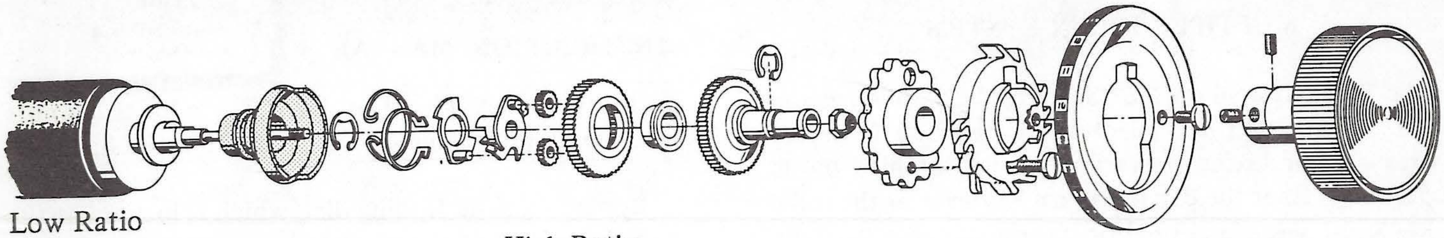


FIGURE 11-1



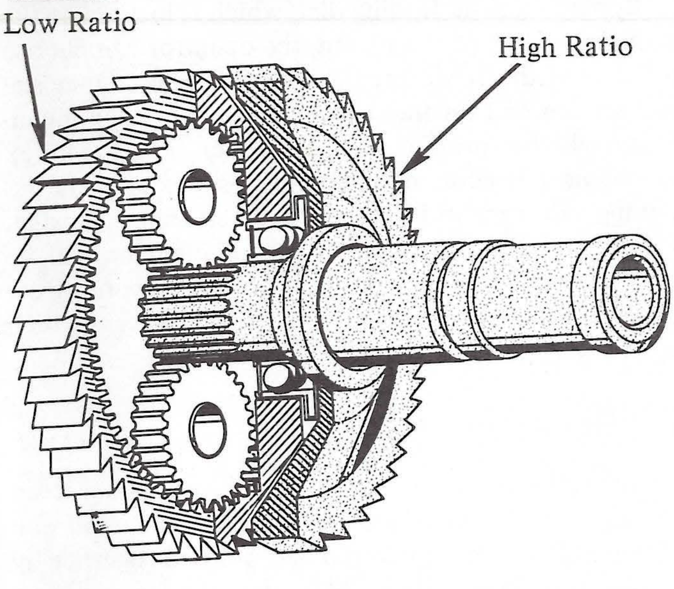


FIGURE 11-2

These names are descriptive of their operations. The low ratio ratchet has less difference (low ratio) between its input and its output than the high ratio ratchet has. For each complete revolution of the low ratio ratchet the platen rotates 4/5 of a revolution. For each revolution of the high ratio ratchet the platen rotates 1/5 of a revolution. If both ratchets are rotated together the ratio of movement between the ratchets and the platen will be one to one.

Both ratchets are 66 tooth ratchets. Feeding the high ratio ratchet just one tooth will cause the platen to index exactly one point. Feeding the low ratio ratchet just one tooth will cause the platen to index exactly four points. Therefore, if both ratchets are fed together just one tooth then five points of feed will be produced to the platen. Five points of feed is the smallest selection that can be produced by this mechanism.

The feed mechanism that feeds these two ratchets has the capability of producing one, two, three, or four teeth of feed to either ratchet for any single index operation. Suppose that fourteen points of feed is desired for an index operation. To obtain fourteen points of feed, all we have to do is control the feed mechanism so that it will feed the low ratio ratchet three teeth, producing twelve points of feed, and the high ratio ratchet two teeth, producing two points of feed. Together, twelve points and two points make up the desired fourteen points. As long as this ratchet feed selection is provided, then fourteen points of feed will be produced each time the index mechanism is actuated. A maximum of twenty points of feed is attained by feeding both ratchets the maximum of four teeth.

The low ratio ratchet contains a large ring gear on its inside perimeter. The high ratio ratchet has a small sun gear at its center (Fig. 11-2). Two planet gears fixed to the platen by a driver assembly fit inside these ratchets in a manner so that they mesh with both the sun gear and ring gear. If the left hand or low ratio ratchet is held stationary while the right hand ratchet or sun gear is rotated, then the sun gear will drive the planet gears causing them to walk slowly around the ring gear. It will take exactly five complete revolutions of the sun gear to cause the planet gears to orbit once. Since the planet gears are connected to the platen and the sun gear is connected to the right hand ratchet, then it will take five revolutions of the ratchet to drive the platen one revolution. Therefore, the ratio of movement between this ratchet and the platen is five to one. This ratchet is called the high ratio ratchet.

Now, let's take a look at the operation of the left hand ratchet. Assume this time that the high ratio ratchet or sun gear is held stationary. Rotating the left hand ratchet or ring gear will drive the planet gears causing them to walk around the sun gear. In one revolution of the ring gear the planet gears will make 4/5 of an orbit around the sun gear. In other words; for every five revolutions of the ring gear, the planet gears will orbit four times, or the ratio between the left hand ratchet and the platen will be five to four. This ratchet is called the low ratio ratchet.

Both of these ratchets mount on the right hand platen shaft in a manner that permits them to rotate freely about the shaft. The low ratio ratchet is mounted, not directly on this shaft, but on a shoulder of the high ratio ratchet. A ball bearing is used in the mounting of this low ratio ratchet to assure that rotational friction between the two ratchets will be held to a minimum. The lateral position of the low ratio ratchet is controlled to the left by the right hand face of the platen bushing and to the right by a shoulder on the outer race of the index bearing (Fig. 11-2). The lateral position of the high ratio ratchet is controlled

to the left by the inner race of the index bearing and to the right by an adjustable self-locking nut threaded on the end of the platen shaft.

The right hand platen knob is set-screwed directly to the sleeve portion of the high ratio ratchet. When the operator manually rotates this knob the result is the same as if the high ratio ratchet were being rotated by its feed mechanism. Thus, a five to one ratio between the rotation of the right hand platen knob and the platen is felt which is exactly the same ratio as between the ratchet and the platen. As the operator rotates this knob she should feel the ratchet click from one tooth to the next as the detent is cammed over each ratchet tooth. Each click of the knob corresponds to one point of feed to the platen. This is the same as if the ratchet were being fed one tooth at a time by its feed mechanism.

Since the platen can be fed in single point increments through manual rotation of the right hand platen knob, then the need for a platen variable is eliminated. This single point feed of the platen provides a much finer increment of motion to the platen than the variable mechanism does on the "Selectric" Typewriter. The variable mechanism on the "Selectric" Typewriter provides a minimum of .025" variation to the platen per serration on the platen ratchet driver. This is .011" greater than a point.

The left hand platen knob is connected directly to the platen. It is set-screwed to the left hand platen shaft. When this knob is manually rotated by the operator, the planet gears mounted on the driver assembly try to rotate both of the platen ratchets. Since they are both held detented and the detenting forces are equal, the ratchet that offers the least amount of resistance to rotation will be forced to rotate. This is the low ratio ratchet. Because of the five to four ratio between the ratchet and the platen, it takes four points of rotation of the platen to cause the low ratio ratchet to rotate a single tooth. Therefore, each time the operator feels a click as she rotates the left hand platen knob, the platen has rotated exactly four points. This left hand knob is especially useful to roll back, correct, and return to the previously typed line without being vulnerable to a vertical error in alignment.

2. Line Space Feed Operation

We mentioned before that the operational area of the index mechanism on up through to the index link is practically the same as the "Selectric" Typewriter.

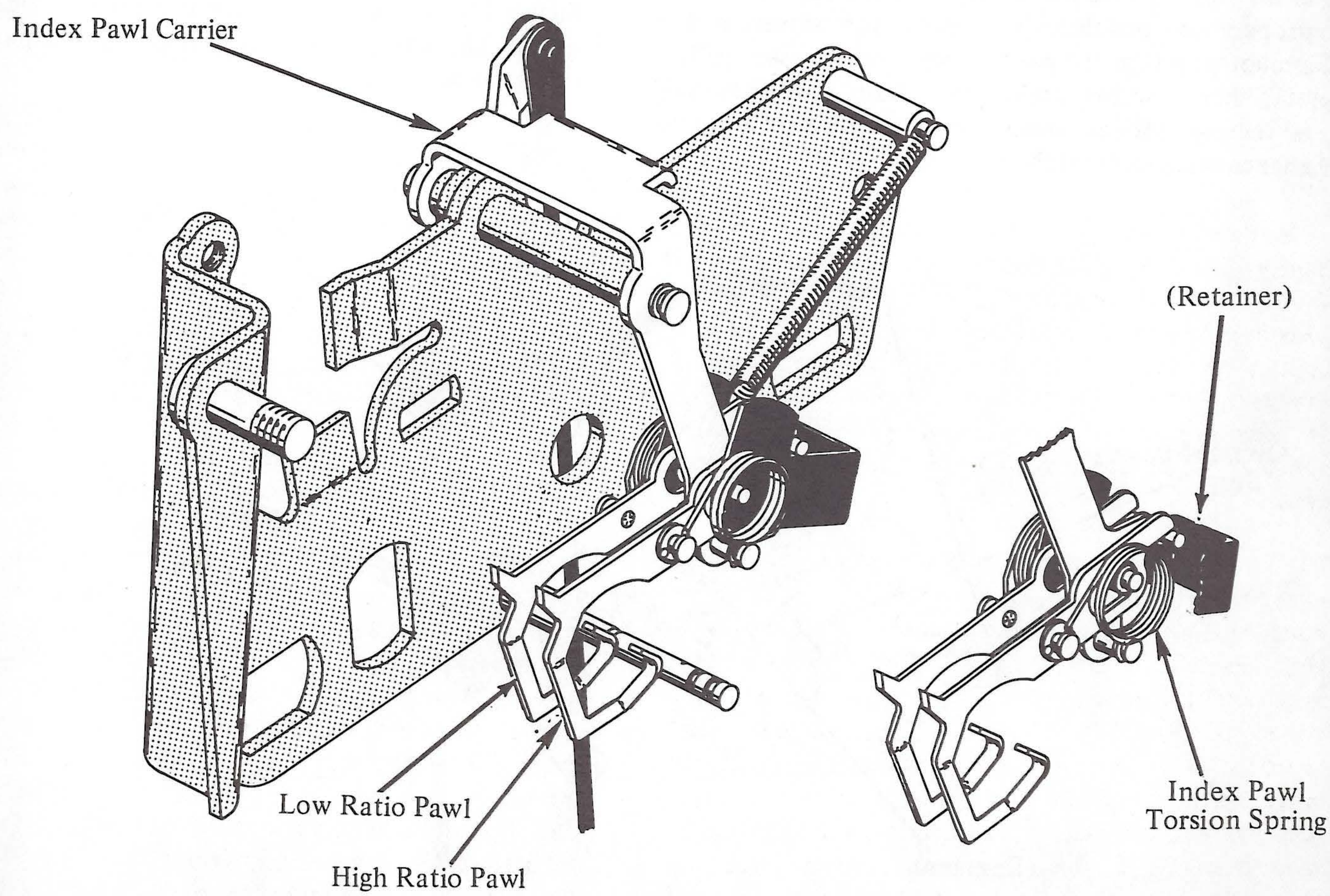


FIGURE 11-3

Because of this we will cover the index feed operation beginning at the index link. The upper end of this link attaches to the inside arm of the index pawl carrier. This carrier is supported on the right hand carriage plate by a pin running through a sleeve which has been ring-welded to the plate. The pin serves as a pivot shaft for this carrier (Fig. 11-3). An extension spring loads the carrier counterclockwise into its rest position.

Two index pawls, one for each ratchet, are mounted on the outside arm of this carrier by a shouldered stud ring-welded to the arm. The low ratio pawl mounts on the inside of the arm while the high ratio pawl mounts on the outside of the arm (Fig. 11-3). A spring retaining clip is used to hold the pawls on their mounting studs. The mounting hole in each pawl is elongated to allow a "floating" action to occur during the driving portion of an index operation. Two hairpin springs, one for each pawl, loads the pawls forward on their mounting stud. These springs, which are called index pawl torsion springs, also load their pawls clockwise into their rotational rest position. With the index pawl carrier at rest, the rotational rest position of the pawls is controlled by a pin riveted to the carrier just behind the stud that mounts the pawls. (Fig. 11-3). This pin functions to hold both pawls clear of their ratchets when the pawl carrier is in its proper rest position. This same pin serves as the anchor point for the pawl carrier restoring spring. The "U" shaped spring retainer that straddles the rear half of these pawls also aids in keeping the pawls properly aligned with their ratchets.

When a pull is produced on the index link the pawl carrier begins to rotate in the clockwise direction. As this happens both of the index pawls begin to sweep forward and up headed for engagement with their ratchets (Fig. 11-4). Once they have fully engaged their ratchets, there is a slight delay while the pawl mounting stud moves to the front of the elongated mounting holes in the pawls. Because of the transfer of momentum from the pawl carrier to the ratchets, the ratchets are kicked ahead of the pawl carrier. Without the elongated holes in the pawls the ratchets would reach their final position ahead of the index pawls. Because the pawls can "float" they are able to stay engaged with the ratchets throughout the driving stroke of an index operation. This permits both the pawls and ratchets to reach the overthrow stop simultaneously, thereby permitting the overthrow stop to wedge the pawls into their ratchets. This wedging action blocks any further ratchet rotation due to momentum of the platen.

The overthrow stop mounts on the outside face of the carriage plate. Two arms of the stop fit into guide slots in the carriage plate allowing the overthrow stop to be adjusted front to rear while maintaining its vertical position (Fig. 11-5). The screw that secures the stop to the plate has an eccentric shoulder which facilitates the front to rear adjustment of the stop. In Figure 11-5 the pawls are shown in their wedged position. The overthrow stop is trapping the pawls in their ratchets.

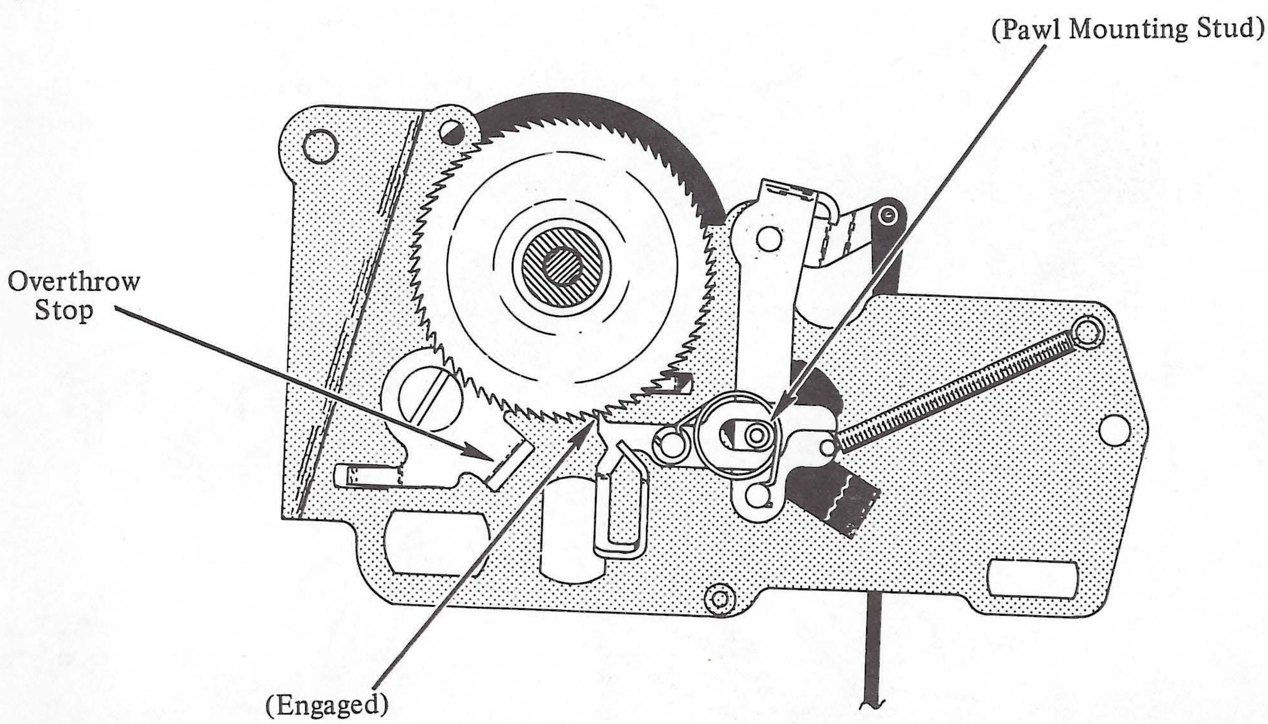


FIGURE 11-4

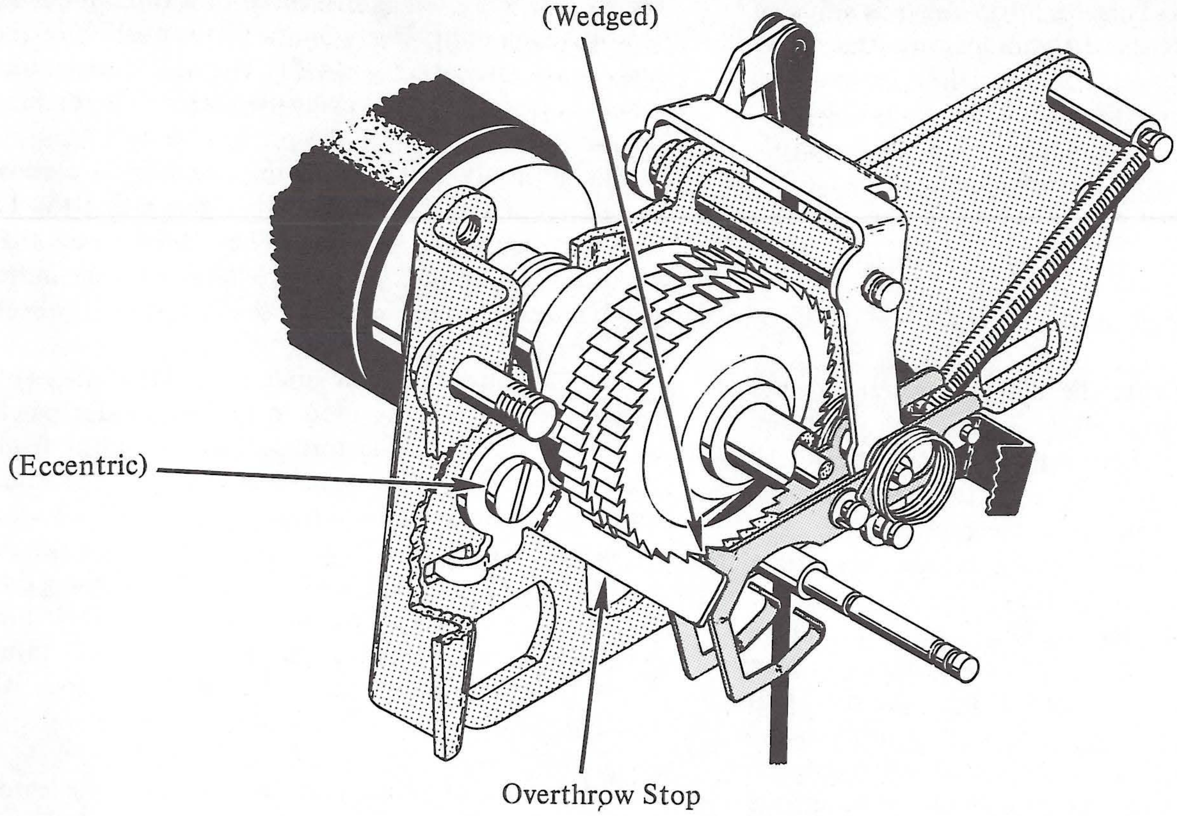


FIGURE 11-5

Since each ratchet can be fed independent of the other, they must each have their own detent lever. Both of these levers mount on the same pivot stud at the front of the carriage plate (Fig. 11-6). A heavy extension spring fastened to the bottom of each detent lever loads these levers against their respective ratchets. An adjustable eccentric sleeve on the pivot stud provides a simultaneous vertical adjustment for both

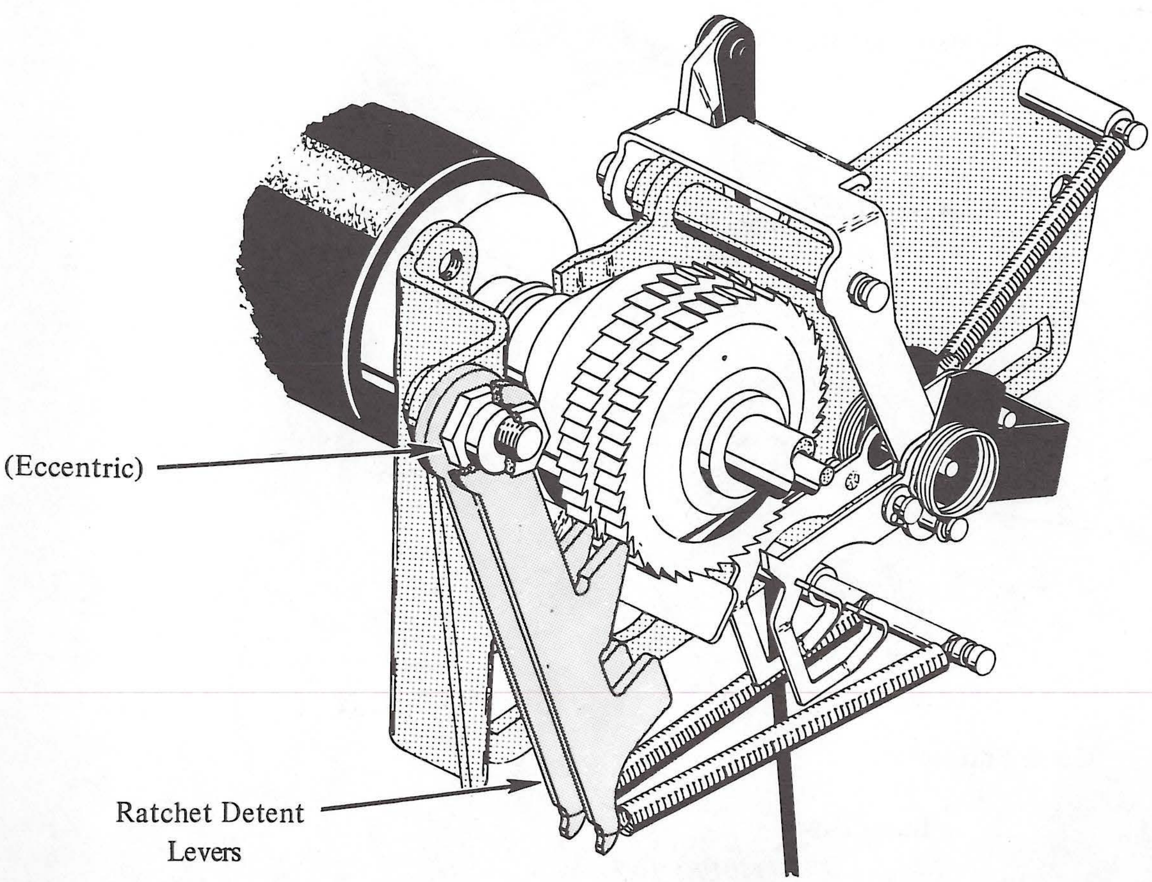


FIGURE 11-6

of the detent levers. This eccentric sleeve is adjusted by rotating the hex-shaped shoulder on the sleeve which is located between the two detent levers. Once the correct vertical position of the detents is obtained, then the outside nut is tightened to lock the eccentric in position. The purpose of this adjustment is only to control the rotational rest position of the two ratchets.

3. Line Space Selection ("Leading")

Recall from earlier that the index pawls are always supplied with enough motion, during each index operation, to feed both of the ratchets four teeth. Recall also that the amount of feed to the platen is controlled by selecting how many teeth of feed each ratchet receives from its pawl during an index operation. Controlling the amount of feed to each ratchet is achieved by merely governing when the pawl will engage the ratchet during its forward stroke. If a four tooth feed of a ratchet is desired, then the pawl that operates the ratchet must be permitted to enter immediately during the forward stroke. If only one tooth of feed is desired, then the pawl must be prevented from entering the ratchet until late in the forward stroke.

The entry of the index pawls into their respective platen ratchets is controlled by the index pawl selector guide. This guide is one piece of a three piece assembly that mounts freely on the sleeve portion of the high ratio ratchet (Fig. 11-7). The entire assembly, which is fastened together by two screws, is retained on the sleeve portion of the ratchet by a "C" clip. It is this assembly that enables the operator to control the entry of the index pawls, thus generating the 16 different line space selections. The three pieces that make up this assembly are: the leading dial, the index pawl selector guide, and the selector detent wheel.

The index pawl selector guide has guide surfaces on its periphery which are used to guide the index pawls into their ratchets. The formed lug, extending from the bottom of each pawl, rests just clear of the guide lugs when the pawls are in their rest position. As soon as an index operation begins the formed lugs of the pawls swing up, contact, and then ride along the guide lugs of the pawl selector guide. As the pawls slide forward the configuration of the guide lugs determine when the pawls can enter and feed their respective ratchets.

The rotational position of the index pawl selector guide is controlled by the operator through the leading dial. A portion of the dial is exposed to the operator through a slot in the machine cover (Fig. 11-8).

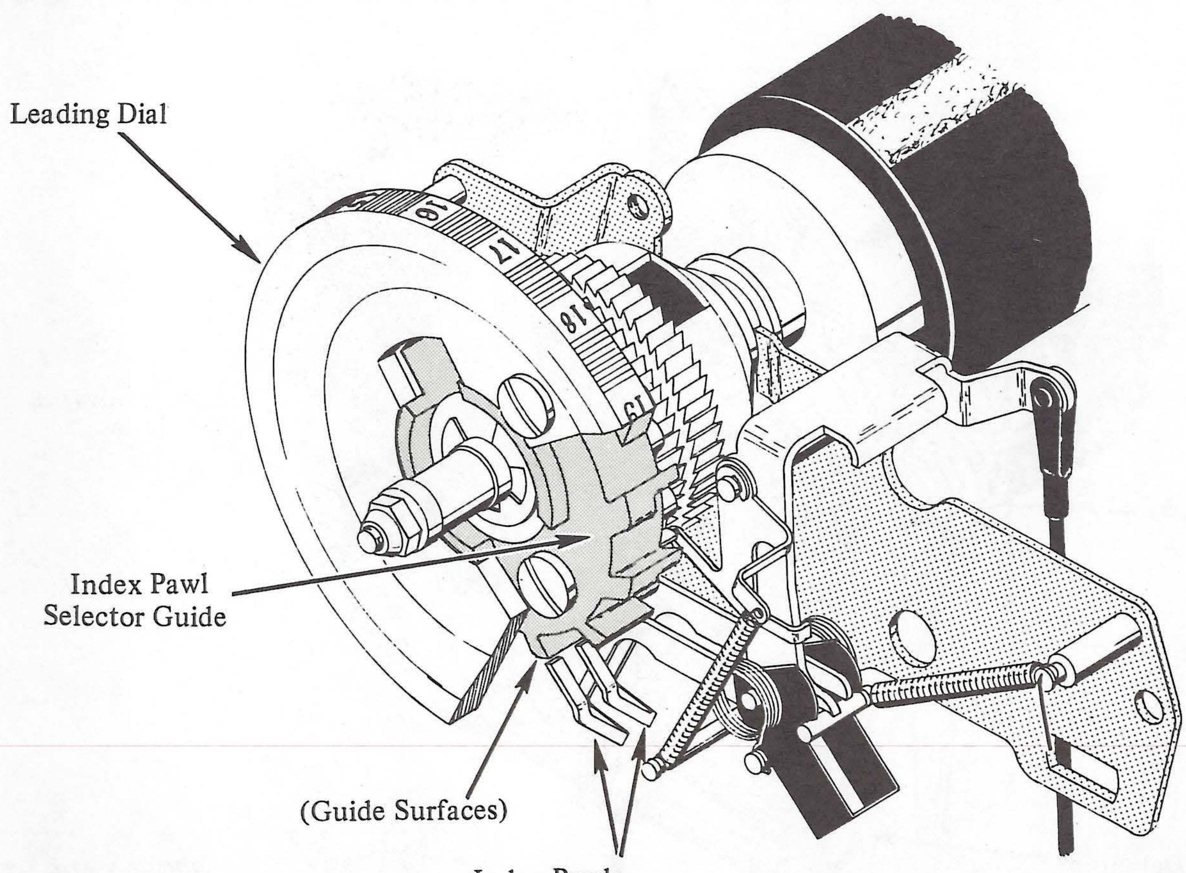


FIGURE 11-7

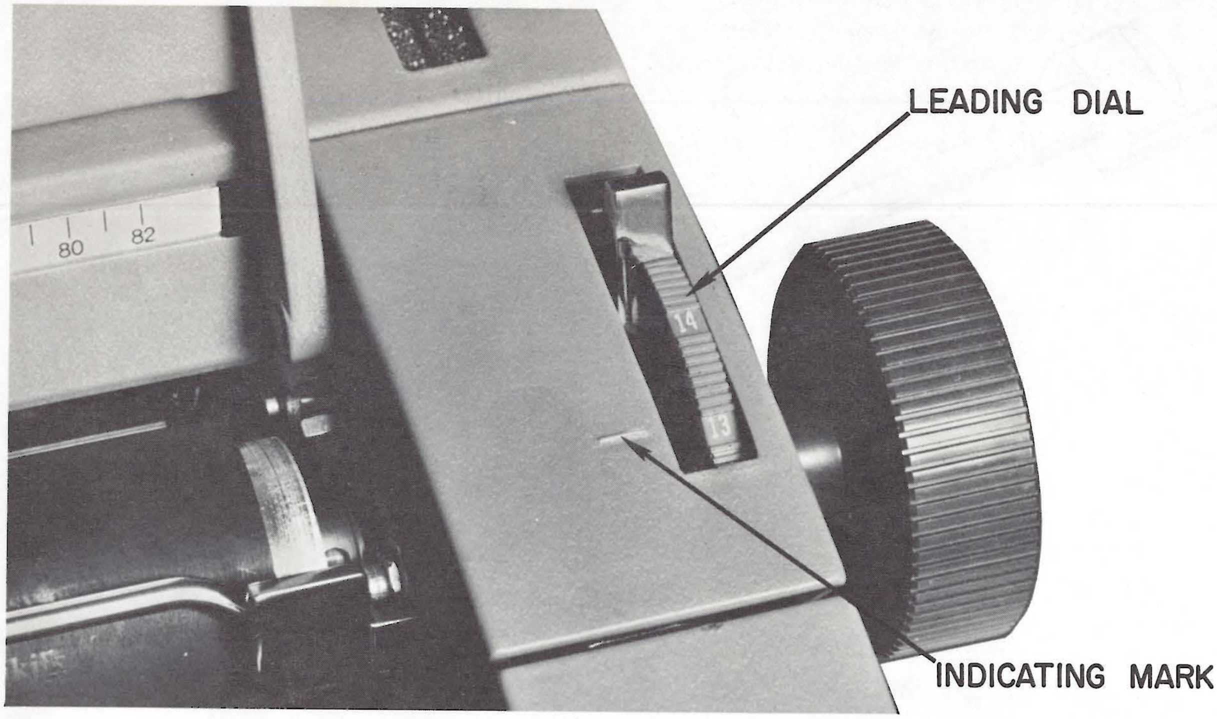


FIGURE 11-8

The periphery of the dial is graduated from five through twenty. To select a line space value the operator merely thumbs the dial around until the desired number aligns with an indicating mark on the machine cover. Serrations on the periphery of the dial make it easier for the operator to rotate the dial.

The index pawl selector guide and dial are detented in position. This is accomplished through the selector detent wheel. The selector detent lever, which mounts on the same pin as the index pawl carrier, is spring loaded against the detent wheel (Fig. 11-9).

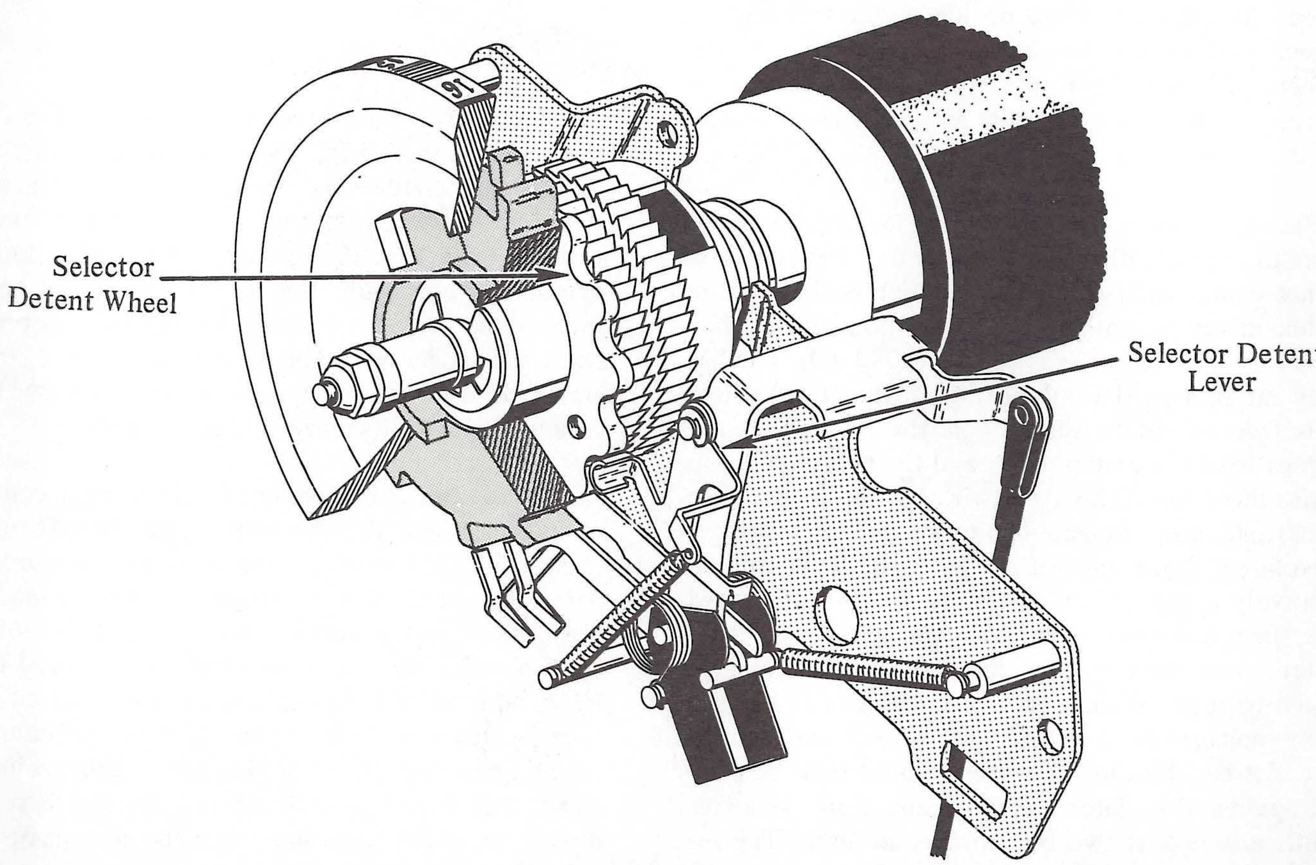


FIGURE 11-9

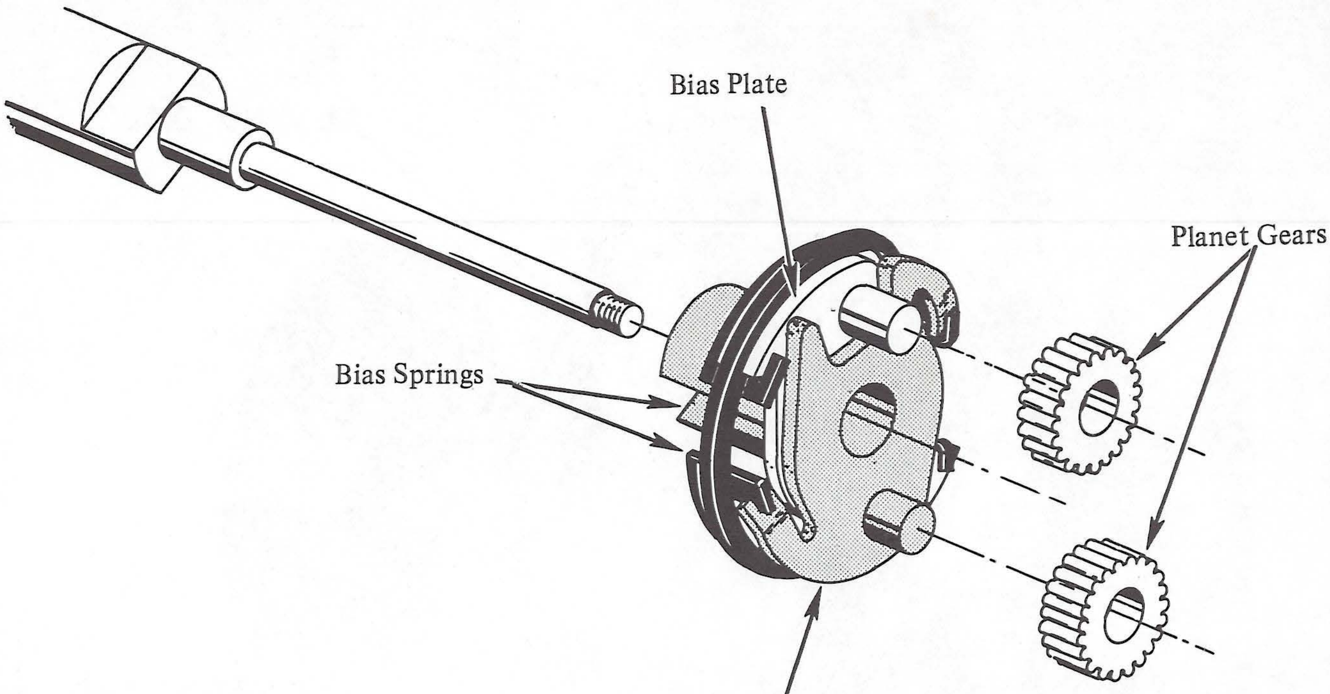


FIGURE 11-10

4. Planetary Gear Bias

Any gear backlash in the planetary gear system can produce a waviness within a typed line. It also can produce a noticeable variation between successive line spaces. To eliminate these problems due to backlash, a gear bias system has been incorporated into the planetary system. This not only eliminates the effects of the backlash, but also acts as a wear compensator for the planetary gear system.

Biasing is accomplished by spring loading the planet gears in opposite directions relative to the platen. One planet gear mounts on a shaft which is fixed to the platen driver. The other planet gear mounts on a shaft which is fixed to the bias plate (Fig. 11-10). The bias plate mounts on the hub portion of the platen driver. It is free to rotate slightly on this hub. Two bias springs load the platen driver and the bias plate in opposite directions. This results in the two planet gears being loaded in opposite orbital directions relative to the platen. Since both of the index ratchets are held positively detented, and the torque output of the two bias springs is greater than the rotational drag of the platen, then the torque of the bias springs causes the platen to rotate slightly until the planet gears are positively engaged with both the ring gear and the sun gear. All backlash in the system would then be taken out against the platen indexing direction. As a final point, notice that two bias springs are used. The reason for this is to balance the spring forces on the system to reduce the bearing reaction to a minimum. Both springs, although shaped differently, apply equal torsional loads on the driver and bias plates. Their different shapes are necessary because of the limited space that they have to occupy in the mechanism.

5. Zero Index Selection

The zero index lever, protruding through the slot in the right hand platen cover on the left side of the leading dial, enables the operator to cancel the platen indexing operation during a carrier return function without disturbing the setting of the leading dial. The operator merely pulls this lever forward and holds it there while the carrier return keybutton is depressed. Once the carrier return operation has finished, the operator releases the lever allowing it to return, under spring tension to its rear or inactive position.

This feature is especially useful during a centering operation where the operator types the information in no-print first to obtain the centering measurement. After the centering measurement has been made the zero index feature allows the operator to hold the same writing line while the carrier is returned to the left hand margin. Zero index is also useful when a mistake has been made in the rough copy that cannot be easily corrected through character backspacing. Instead, the carrier is returned and the line is retyped directly over the same line; thus the correct justification data is generated.

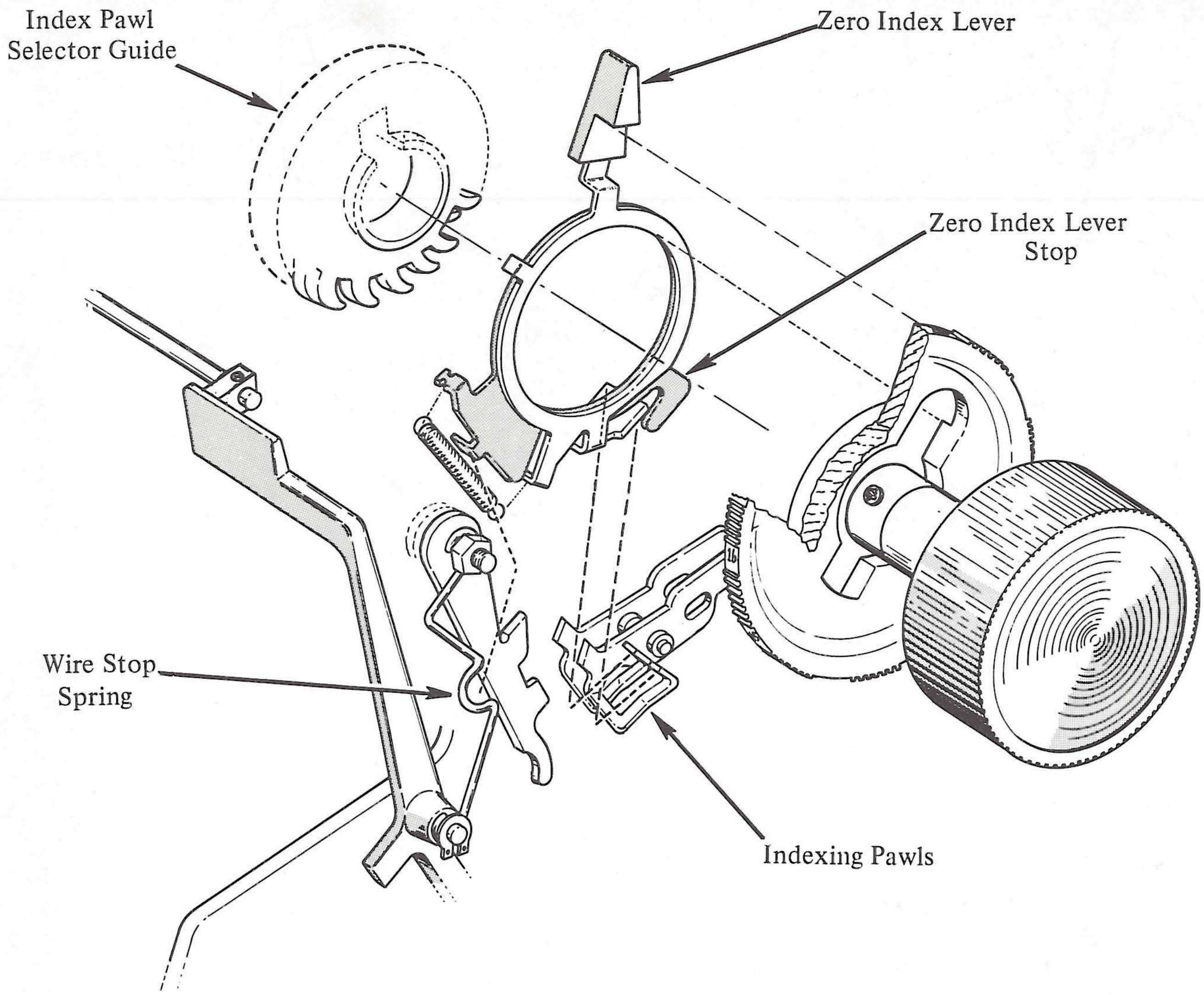


FIGURE 11-11

The zero index lever assembly mounts on the right end of the platen between the leading dial and the index pawl selector guide. Its whole function, when the lever is pulled forward, is to restrict the indexing pawls from entering their ratchets as they are powered forward on their feed stroke. A wide lug on the bottom of the lever acts as a shield to the indexing pawls. When the lever is forward this wide lug is positioned in between the formed lugs of the indexing pawls and the guide surfaces of the index pawl selector guide (Figure 11-11). This causes the indexing pawls to be directed down beneath the overthrow stop in their forward travel resulting in a no index operation.

The zero index lever and zero index lever stop mount together freely on a narrow shoulder of the leading dial. A wire stop spring, which mounts between the paper bail mounting stud and the stud that mounts the ratchet detent levers, serves to rotationally lock the zero index lever stop in place. A small tab on the lever stop is nested into a formed notch in the wire. This method of locking the lever stop is used because it simplifies the platen remove and install procedure for the operator. To remove the platen the latches are released and the platen is lifted out the same as on a standard "Selectric" Typewriter. To re-install, the operator must hold the zero index lever at the top of the leading dial as she inserts the platen. Once the platen has been installed the operator pushes the lever toward the rear. This causes the small tab on the lever stop to slide up the wire stop spring to its detented position.

The purpose of the zero index lever stop is to carry the extension spring that loads the zero index lever into its inactive position and to provide the rest and active limits to the zero index lever. Figure 11-12 shows the mechanism in both its rest and active positions.

During a zero index operation there is no interference between the indexing pawls and the overthrow stop. The shield-like lug on the zero index lever causes the tips of the pawls to be guided beneath the overthrow stop.

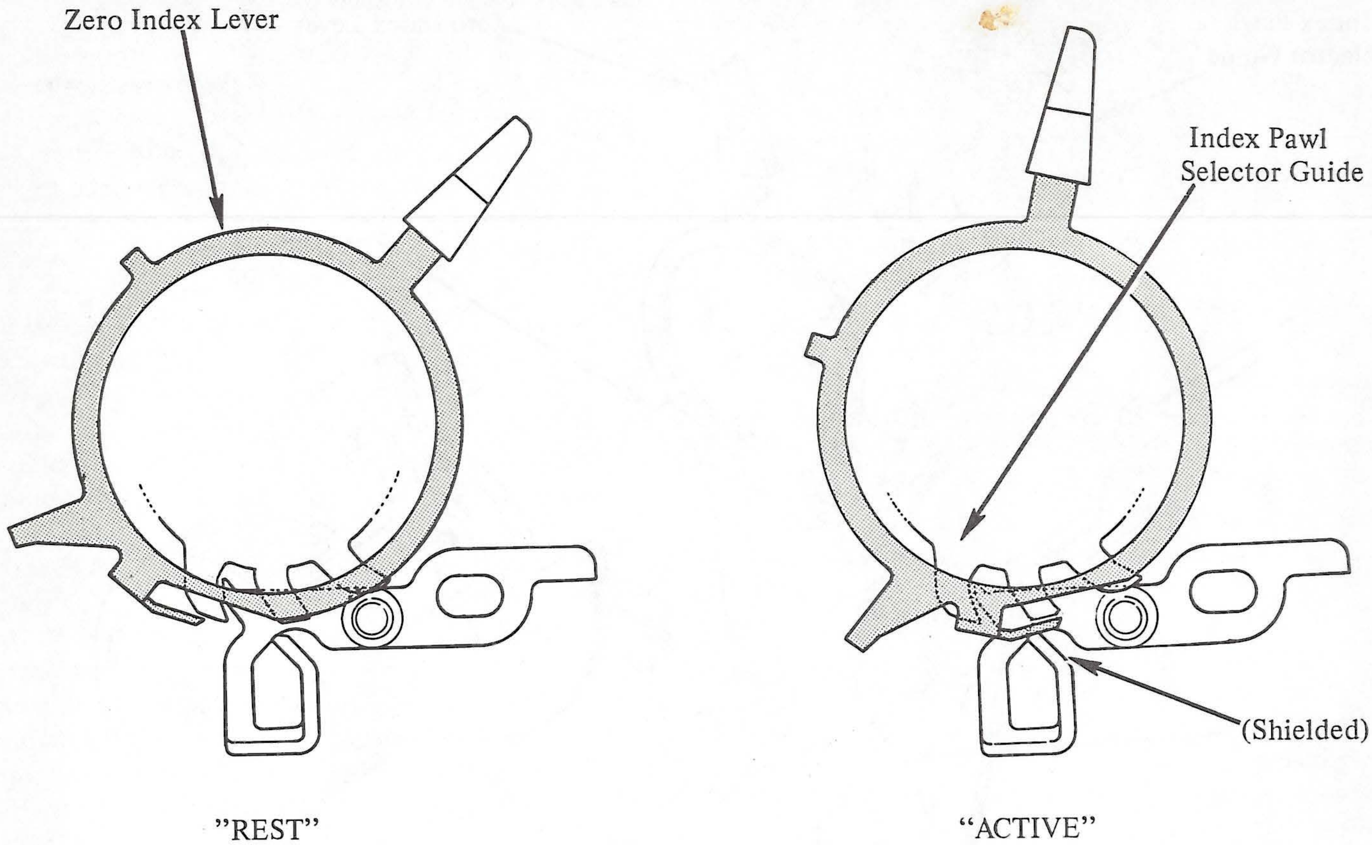

Zero Index Lever
Index Pawl
Selector Guide
(Shielded)
"REST"
"ACTIVE"

FIGURE 11-12

RIBBON

The IBM "Selectric" Composer uses a film ribbon mechanism that is basically the same mechanism as used on the standard "Selectric" Typewriter. It differs mainly in two areas: The supply and take-up spools are larger in diameter so that a larger spool of ribbon may be used, and the ribbon operating controls have been moved for better operator accessibility.

A larger spool of ribbon is needed on the "Selectric" Composer because of the proportional spacing. The character yield per foot of ribbon is considerably less than on the "Selectric" Typewriter because the ribbon must feed enough on each print operation to satisfy a 9 unit character. In addition, a higher character yield ribbon is more convenient for the "Selectric" Composer when used automatically on the Magnetic Tape "Selectric" Composing System. The ribbon length is approximately 375 feet with a yield in the vicinity of 60,000 characters.

Because the front of the carrier is shielded by the justifier mechanism the ribbon control lever and ribbon load lever are now located on the top of the carrier. Both the ribbon control lever and ribbon load lever are designed to match the impression control lever. The lever on the left side of the typing element is the ribbon control lever while the one directly in front of the element is the load lever.

The "Selectric" Composer uses a 2122 ribbon. The 2122 ribbon may be used for preparing copy for photo-offset plates or preparing direct image offset plates. The 2122 ribbon will not bleed when used with fixative sprays.

Each new ribbon comes equipped with a take-up spool and a threading arm (Fig. 12-1). The threading arm has two functions: It facilitates placing the ribbon around the feed roller during installation and it serves as a tool for storage of a partially used ribbon by tying the take-up spool to the supply spool.

The ribbon comes packaged with the threading arm attached to the take-up spool as shown in Figure 12-1. The clean leader anchored to the core of the take-up spool makes one loop around the threading arm and then returns back to the core of the take-up spool where it is clamped against the core by an ear of the threading arm. From here the clean leader runs over to the supply spool. To install the ribbon the operator places the supply spool on its pivot stud, threads the ribbon around the shock spring and through the ribbon lift guides, and then positions the

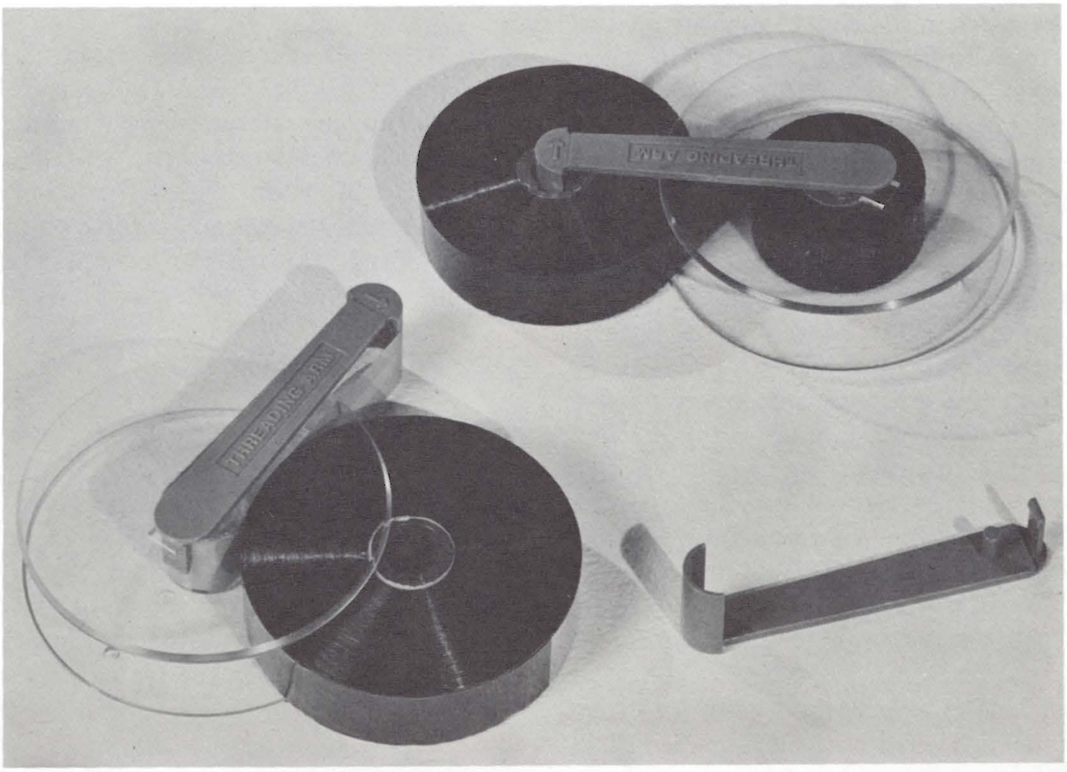


FIGURE 12-1

take-up spool rotationally so that the outer end of the threading arm sets directly above the feed roller. With it in this position she merely pushes the take-up spool down onto its pivot stud. When she does this the threading arm is forced up and out of the take-up spool by the pivot stud leaving the ribbon properly threaded around the feed roller.

The threading arm may be used to store and re-install a partially used ribbon. To do either of these functions the small clamping ear on the threading arm (directly behind the pin) must be broken off first. The pin that originally fit into the core of the take-up spool is then re-inserted into the same hole on the now partially filled take-up spool. The spoon-like portion at the left end of the threading arm is then inserted into the core of the partially used supply spool. With both spools tied together by this arm they can be stored more conveniently.

To re-install a partially used ribbon, the operator first removes the supply spool from the threading arm and installs it on its pivot stud. After threading the ribbon through the lift guides the operator then turns the threading arm clockwise one full turn about its pivot point in the take-up spool. This places a wrap of ribbon around the threading arm the same as on a new ribbon. The take-up spool is then installed in the same manner as before.

1. Ribbon Feed

The ribbon feed mechanism is the same as on the standard "Selectric" Typewriter. The only difference is that on the "Selectric" Composer the ribbon feed operation is inhibited during all spacebar and no-print operations. This increases the character yield per spool of ribbon by approximately 20%.

The inhibiting action is developed from the selection motion of the velocity slider assembly. Any time the velocity slider assembly shifts to its no-print position it actuates the ribbon feed lockout lever which, in turn, inhibits the ribbon feed cam follower from operating. The lockout lever mounts on a bracket attached to the side of the carrier by two screws (Fig. 12-2). The top of the lever is spring loaded away from the ribbon feed cam follower by an extension spring which is anchored between the lever and its mounting bracket. When at rest, the bottom of the lever rests in the path of a tab on the velocity tape connector.

When the machine is at rest the ribbon feed cam follower sits on the high point of the ribbon feed cam. As a print cycle gets underway the follower starts to follow the cam toward its low point. If either a space-

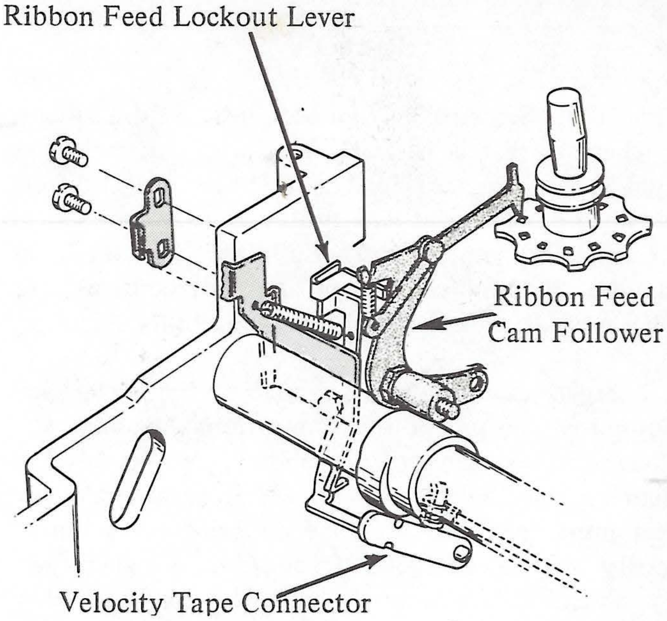


FIGURE 12-2

bar or no-print operation has been selected the velocity slider assembly will shift its maximum distance to reach the no-print lobe on the print cam. When this happens the tab on the tape connector picks up and drives the lower end of the lockout lever with it. This causes the upper end of the lockout lever to swing into the operating path of the ribbon feed cam follower thereby interrupting its motion as it is following its cam towards the low point. Thus, the ribbon feed operation for any no-print cycle is locked out.

As the feed cam returns to its high point, at the end of the cycle, the ribbon feed cam follower is again picked up and rotated forward pushing the feed pawl back into engagement with the same window in the feed and lift wheel. When the follower is picked up by the cam, the restraining force on the lockout lever is removed allowing the lockout lever to restore against a stop lug on the lockout lever bracket.

2. Ribbon Lift

(Same as standard "Selectric" Typewriter)

3. Ribbon Load

When the operator desires to change the ribbon, she begins by pushing the red tipped ribbon load lever toward the rear. This is the lever located in the center of the carrier between the typing element and the feed roller. Pushing the lever toward the rear causes the ribbon lift guide arms to rise and pivots the pressure roller out of engagement with the feed roller so that the operator can easily install the ribbon.

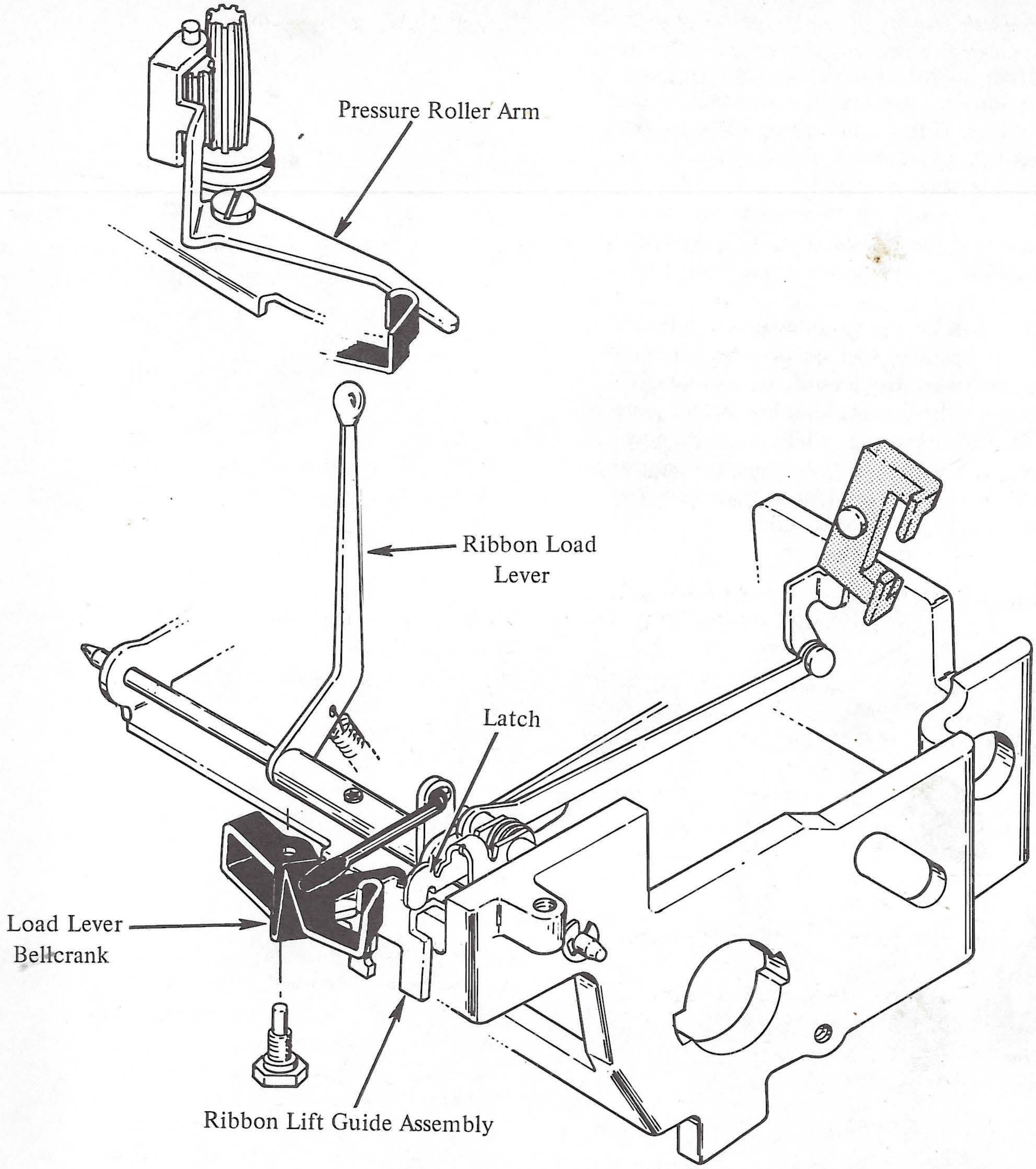


FIGURE 12-3

The ribbon load lever is mounted on the same fulcrum wire that mounts the ribbon lift guide assembly (Fig. 12-3). A setscrew in the hub of the load lever locks it to the fulcrum wire. A light extension spring anchored between the load lever and the ribbon feed cam follower mounting bracket biases the load lever lightly toward the rear.

When the load lever is pushed to the rear a pull is produced on the load lever link causing the load lever bellcrank to rotate counterclockwise. The bellcrank is mounted to the front of the carrier by a hexagon-headed screw. As the bellcrank is rotated counterclockwise its lower arm pushes against a tab on the front of the ribbon lift guide arm assembly pivoting it into its elevated position. Also, at the same time, the upper arm of the bellcrank drives the right hand end of the pressure roller lever toward the rear disengaging the pressure roller from the feed roller.

A latch mounted on a pin at the right side of the carrier serves to latch the ribbon load lever bellcrank in its active position"Fig. 12-3".

4. Ribbon Control

An operator often finds it necessary to begin typing at a specific location on her copy. The function of the ribbon control lever is to enable the operator to lock out the ribbon lift operation so that she can type on her copy without leaving an inked impression. The dry impression, which is visible, is then used to guide the operator in locating the desired spot. This feature is especially useful when typing on a pre-ruled form.

The ribbon control lever is mounted on the left side of the carrier. It operates in a slot in a detent plate just as the impression control lever does. A shouldered screw mounts both the control lever and detent plate to the inner face of the carrier. While the screw anchors the detent plate solidly to the carrier the control lever is free to pivot on the shoulder of the screw. The detent notches in the plate contain the control lever into either its no lift or print position.

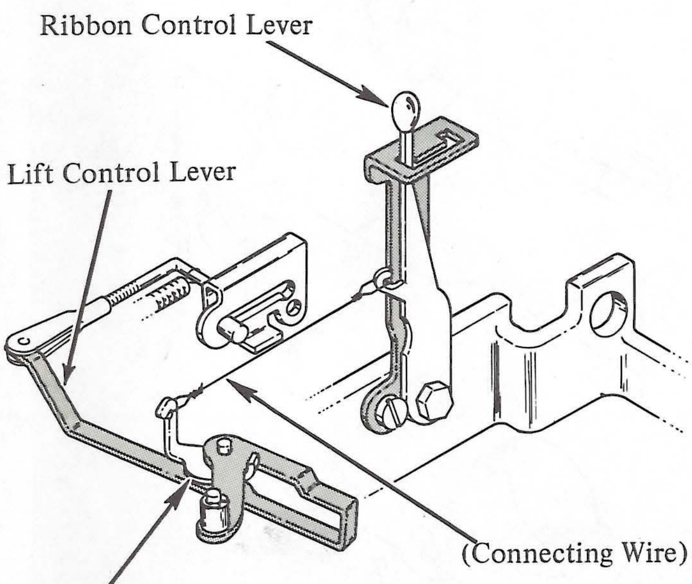


FIGURE 12-4

Moving the ribbon control lever toward the platen causes the ribbon lift mechanism to become inoperative. The lockout of the lift operation is accomplished by the ribbon control bellcrank which pivots on the carrier about the same stud that mounts the lift control lever. As the ribbon control lever is moved toward the platen the bellcrank is pulled clockwise by a connecting wire. The bellcrank then, through a small ear, rotates the lift control lever out of contact with the feed and lift wheel (Fig. 12-4). The lift control link, in turn, moves to the rear of the slot in the lift cam follower where no lifting motion will be felt to the ribbon lift guide assembly.

JUSTIFICATION

Justification is the process of spacing type so that a printed line will be of an exact length. In the printing industry a printed line is usually justified by expanding the spacing between words. On occasion the spacing between characters within a word can be evenly expanded to obtain justification. Semi-automatic justification on the "Selectric" Composer can only be accomplished by expanding the spacing between words. This is done by means of a variable spacebar. The principle is similar to that used on the "Executive" Typewriter except that the process is considerably easier from an operator's standpoint and more exacting from a printer's point of view.

To justify efficiently and effectively, the extra space that must be added between words to give the printed line its justified length should be distributed as evenly as possible between all words within that line. The variable spacebar operated in conjunction with the justifier mechanism enables this to be easily done on the "Selectric" Composer. The spacebar can be set at any value from 3 to 9 units.

If after rough typing a line containing eight spacebar operations each of which is 3 units wide, it is realized that 16 units of space must be added to the line to justify it, then this line should be retyped using a spacebar value of 5 units per spacebar instead of 3 units per spacebar. Increasing each spacebar by 2 units would add to the required 16 units of space evenly across the entire length of the line or across the 8 spacebar operations.

Take another example: a line of type that contains only four spacebar operations, each of which is 3 units wide. Assuming that this line also requires 16 units of additional space to justify it, each spacebar would have to be increased from a value of 3 units to a value of 7 units, thus obtaining the desired increase of 16 units. Once again, the added space is spread evenly across all spacebar operations within that line.

To this point we have simulated only a simple justification example. That is, the amount of justified space to be added was easily divided up between the number of spacebars within that line.

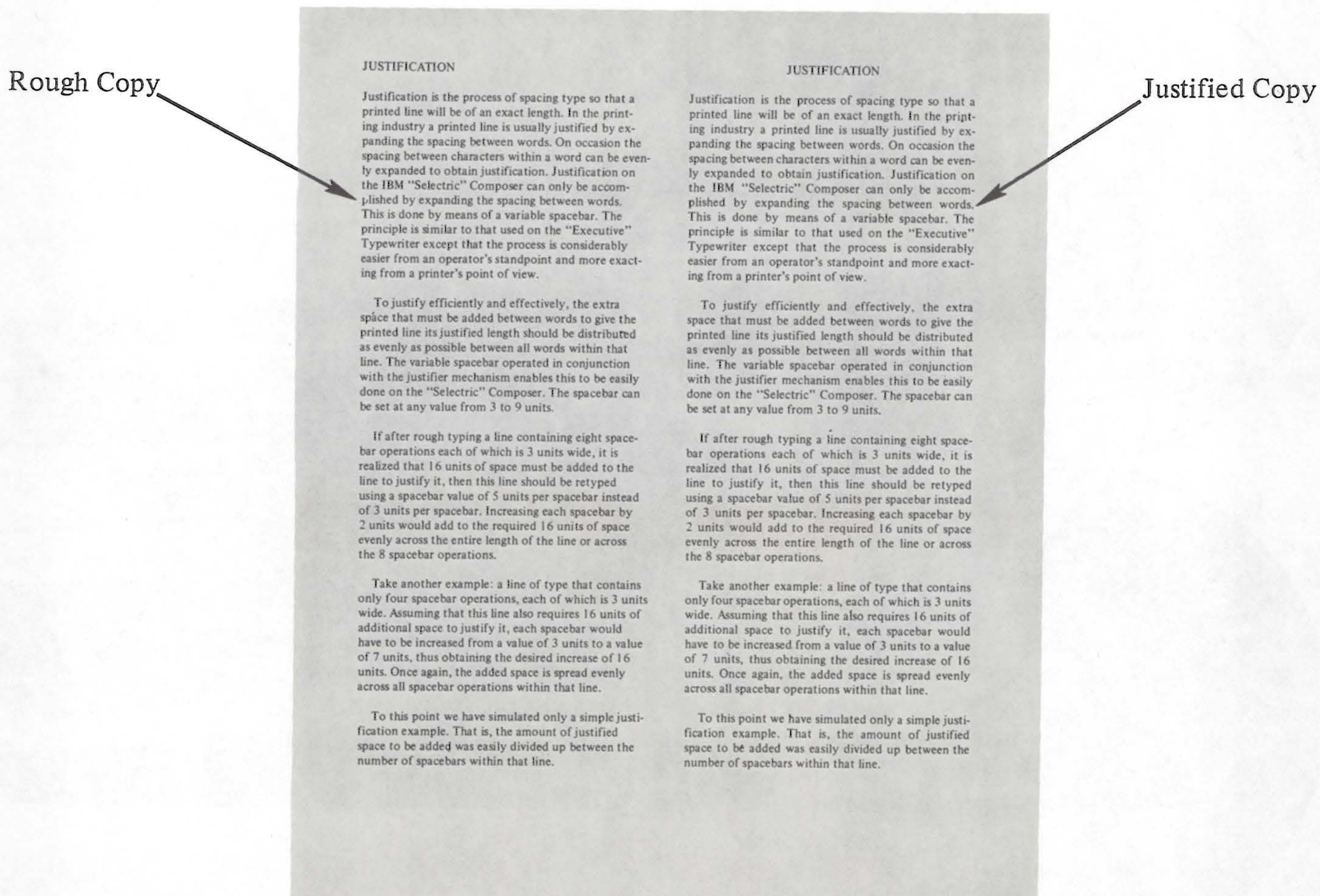


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FIGURE 13-1

Take a more difficult example: a line of unjustified copy that contains eight spacebar operations, each of a 3 unit value. Assume that the end of this line falls 19 units short of the right hand margin. These 19 units, like the other examples, should be distributed as evenly as possible throughout the eight spacebar operations. If we increase the value of each spacebar by two units, a total of 16 units can be gained. This still leaves an extra three units to be added. By increasing the first 3 spacebars by one more unit, that is from 5 to 6 units, the extra three units will be added to the line. In summary, the first three spacebars would be of a six unit value and the other five subsequent spacebars of a 5 unit value. This would give us the desired 19 units needed to justify this line.

This is exactly how the "Selectric" Composer justifies. Each line is typed twice. During the first typing the justifier mechanism counts the number of spacebars that occur in that line and also measures how many units the carrier is from the right hand margin after the last character in the line has been typed. From these two measurements the justifier mechanism indicates to the operator what value spacebar she should select to spread the additional number of units requires evenly throughout the typed line. If this indicated amount is not a direct multiple of the number of spacebars that occurred within the line, then the mechanism will also reflect to the operator how many extra units must be gained in the early portion of the line. She then makes her justifier settings accordingly and then types out the line a second time, producing her final justified copy.

OPERATING PRINCIPLES

There are several different methods of doing justification work on the "Selectric" Composer. The most common is where the operator types the material in columns or galleys. The left hand column contains the first typing which is unjustified. This is called "rough copy". The purpose of this rough copy is to generate justification data so that when the material is retyped in the right column it can be justified (Fig. 13-1).

After selecting the desired escapement the operator must position the indicator tube assembly so that it corresponds to this escapement setting. The three different positions of the pitch selector lever and the

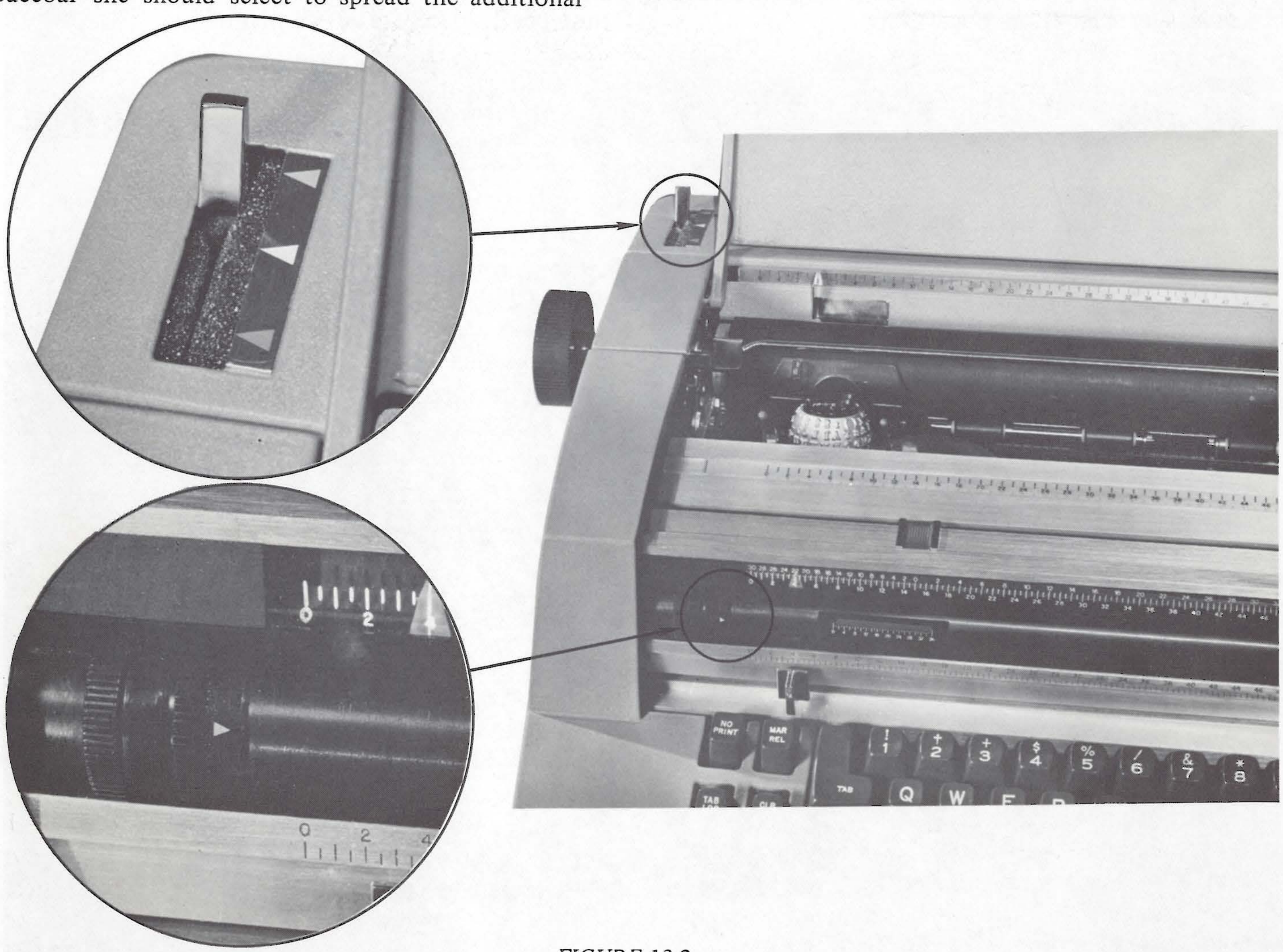


FIGURE 13-2

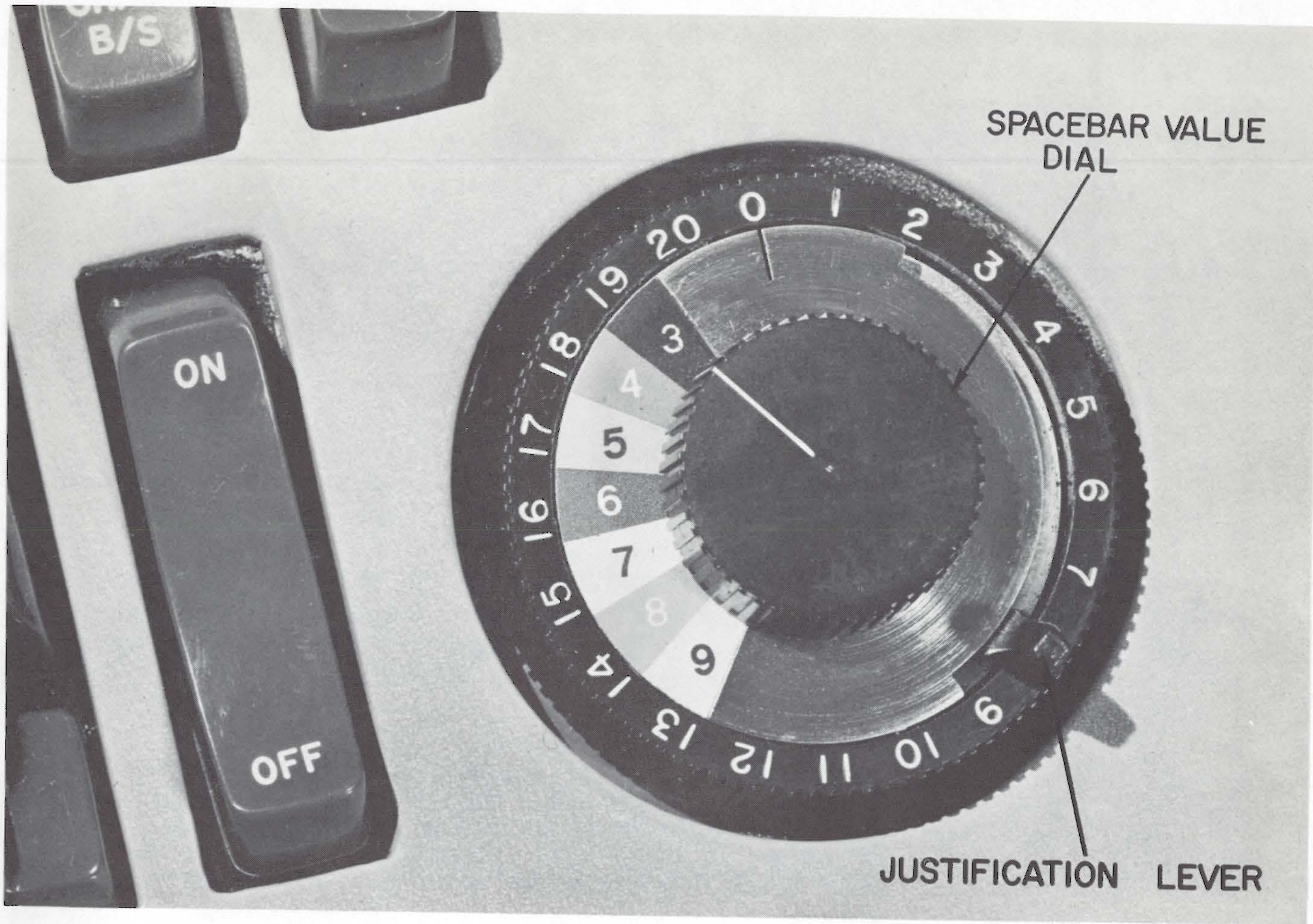


FIGURE 13-3

three corresponding indicator tube positions are color coded (Fig. 13-2). The operator merely has to match the colors to duplicate the settings. The left margin stop, which sets in increments of 1/6 of an inch, should be set for the left margin of the left hand column.

The right hand margin, which sets in increments of 1/12 of an inch in order to provide a finer variance in column width settings, should be set to obtain the right hand margin of the left hand column. The position of the left margin for the right hand column is determined by the setting of a tab stop. Like the left hand margin stop, the tab stops set in increments of 1/6 of an inch.

Once the margins are set, the carrier should be returned to the left hand margin. This causes the justifier mechanism to automatically reset to a zero or home position. The tube mechanism is ready to begin counting spacebars. Now, the final step before the operator may begin to type her rough copy is to pull the justification lever (Fig. 13-3), which is located in the lower right hand corner of the Keyboard, into its "read" position (clockwise). Pulling this lever into this position accomplishes two things. First, it automatically picks up the spacebar value dial (Fig. 13-3), and rotates it to a 3 unit setting. This is the value that must be used whenever rough justification copy is being typed. The second thing that occurs when the justification lever is pulled into its "read" position is that a selection mechanism is actuated setting up the justifier mechanism to count the spacebar operations that are going to occur in the line.

The operator may now begin to type her rough copy. Each time she strikes the spacebar, the inner tube of the justifier indexes one step. This indexing action, in effect, is counting spacebar operations. Every time this inner tube steps, it places a new color bar in position to be exposed to the operator, through a window in the outer tube, when the carrier enters the justification zone (Fig. 13-4). The lateral position of this color bar in the indicator window tells the operator what spacebar value must be selected when justifying this line. There are twenty different color bars painted on the outside surface of the inner tube. Each bar corresponds to a specific number of spacebar operations that may occur within a line (up to a maximum of twenty). Each color on a bar

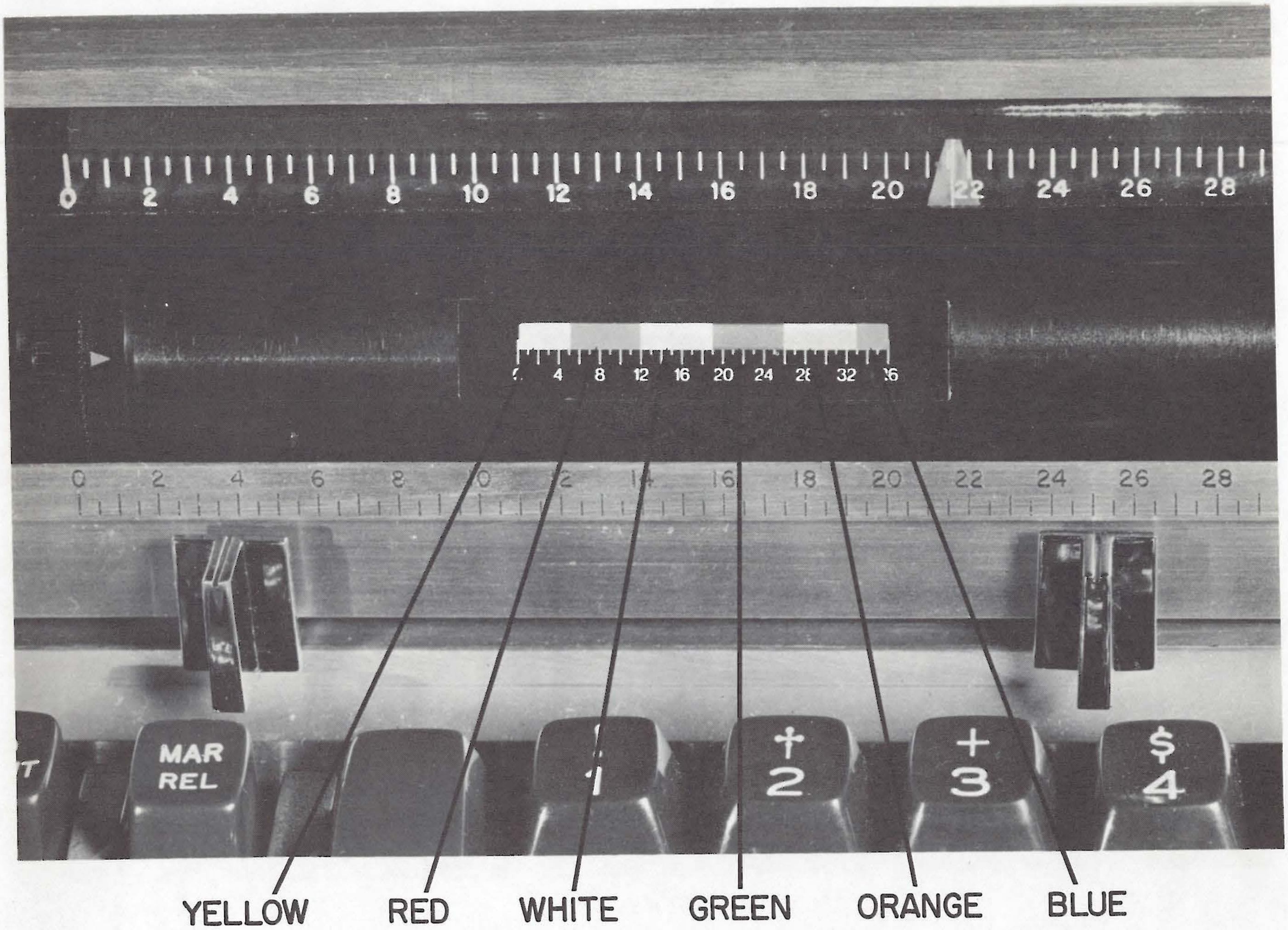


FIGURE 13-4

represents a spacebar value. There are six colors on every bar (Fig. 13-5).

There are also six corresponding colors on the spacebar value dial as shown in Figure 13-5. As the carrier enters the justification zone, it picks up the outside indicator tube, which contains the indicator window, and slides it laterally across the color bar that has been placed in the window. At the same time that the carrier enters the zone the bell rings warning the operator that she is approaching the right hand margin. Once the carrier has come to rest within the justification zone, the operator takes two readings from the indicator window. She reads a color and a number. The color she reads is the first color that is visible at the left end of the indicator window.

White Line Represents Right Hand Margin

9 Units	8 Units	7 Units	6 Units	5 Units	4 Units	3 Units
Yellow	Red	White	Green	Orange	Blue	Black

FIGURE 13-5

This color represents the spacebar value that must be selected when this line is retyped for justification. The number she reads tells her how many times the machine should use this spacebar value when the line is justified. She reads this number from a graduated scale located along the bottom edge of the indicator window (Fig. 13-6).

This scale is called the indicator scale. Each increment on the scale represents a unit of escapement. To read this scale the operator merely observes how far along the scale the selected color extends. Suppose the first color shown at the left end of the window were green, and it extended up the graduated scale to a reading of seven. To an operator this would mean that in order to justify the line she must rotate her spacebar value dial to a green setting and rotate her spacebar quantity dial to a setting of seven (Fig. 13-7). She would then tab over to her tab stop that has been set for the left hand margin of the justified column. Typing out this exact same line with this justification data spplied to the variable spacebar will cause the line to print out justified.

The setting of the spacebar quantity dial directs the number of times that the selected spacebar value will be used in justifying the line. This quantity dial is operated internally by a stepping mechanism. Each time a spacebar is struck the stepping mechanism reduces the setting of this dial by one increment. When the quantity dial is stepped from the "one" to the "zero" setting it causes the spacebar value dial to step down to the next lower value. That is, if the spacebar value dial were set on six and the quantity dial were set on seven, then on the seventh spacebar in that line the spacebar value dial would step to a setting of five. From then on all spacebar operations in that line would be five units.

Let's simulate another justification problem. An operator typing rough copy reaches the end of a line. The carrier is in the justification zone. Let's assume that the line contains thirteen spacebar operations and that when she ended the line the carrier stopped 29 units short of the right hand margin. This means that when she retypes the line to justify it she must add 29 units. If she adds 2 units to each of the 13

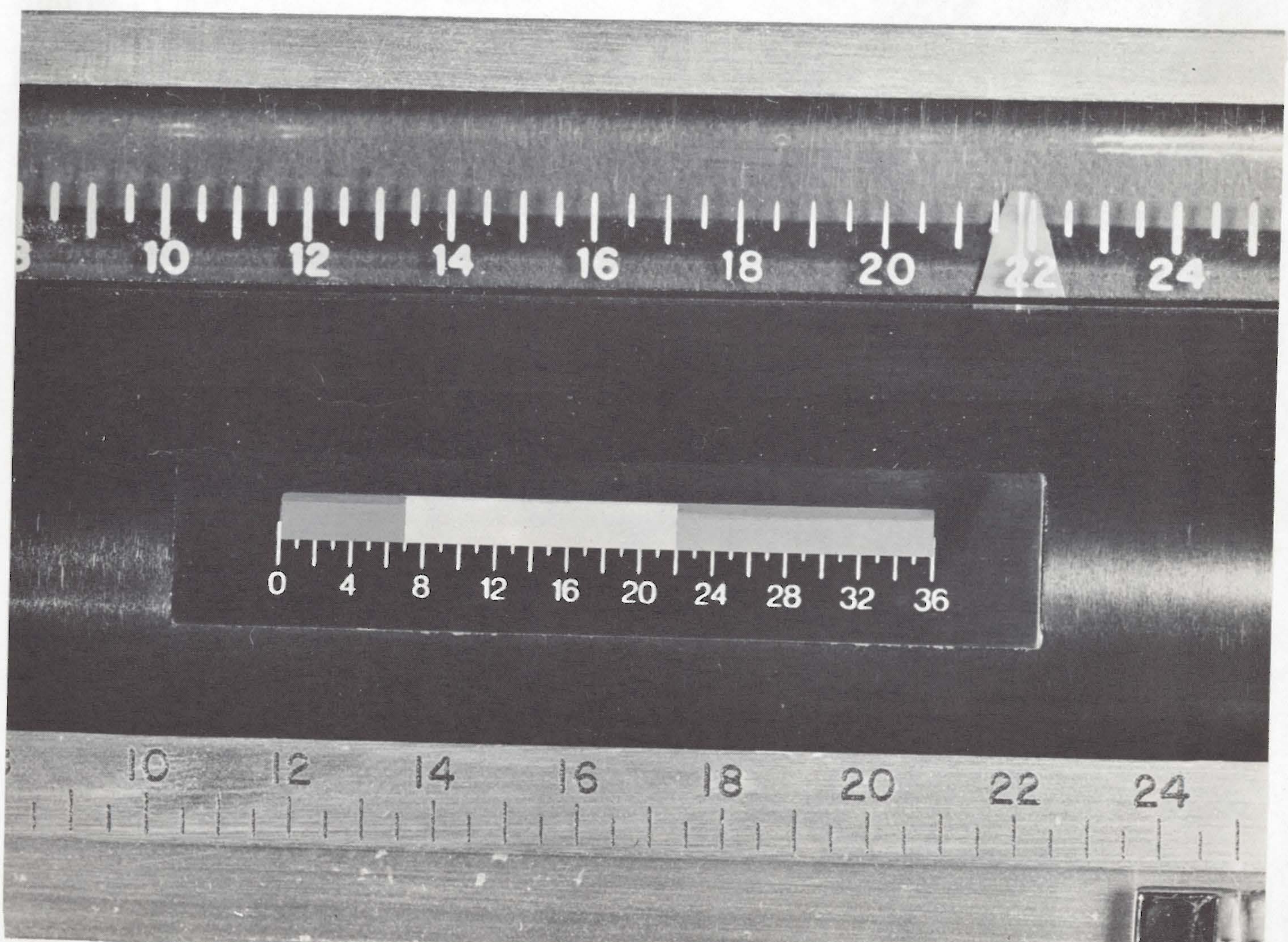


FIGURE 13-6

FIGURE 13-7

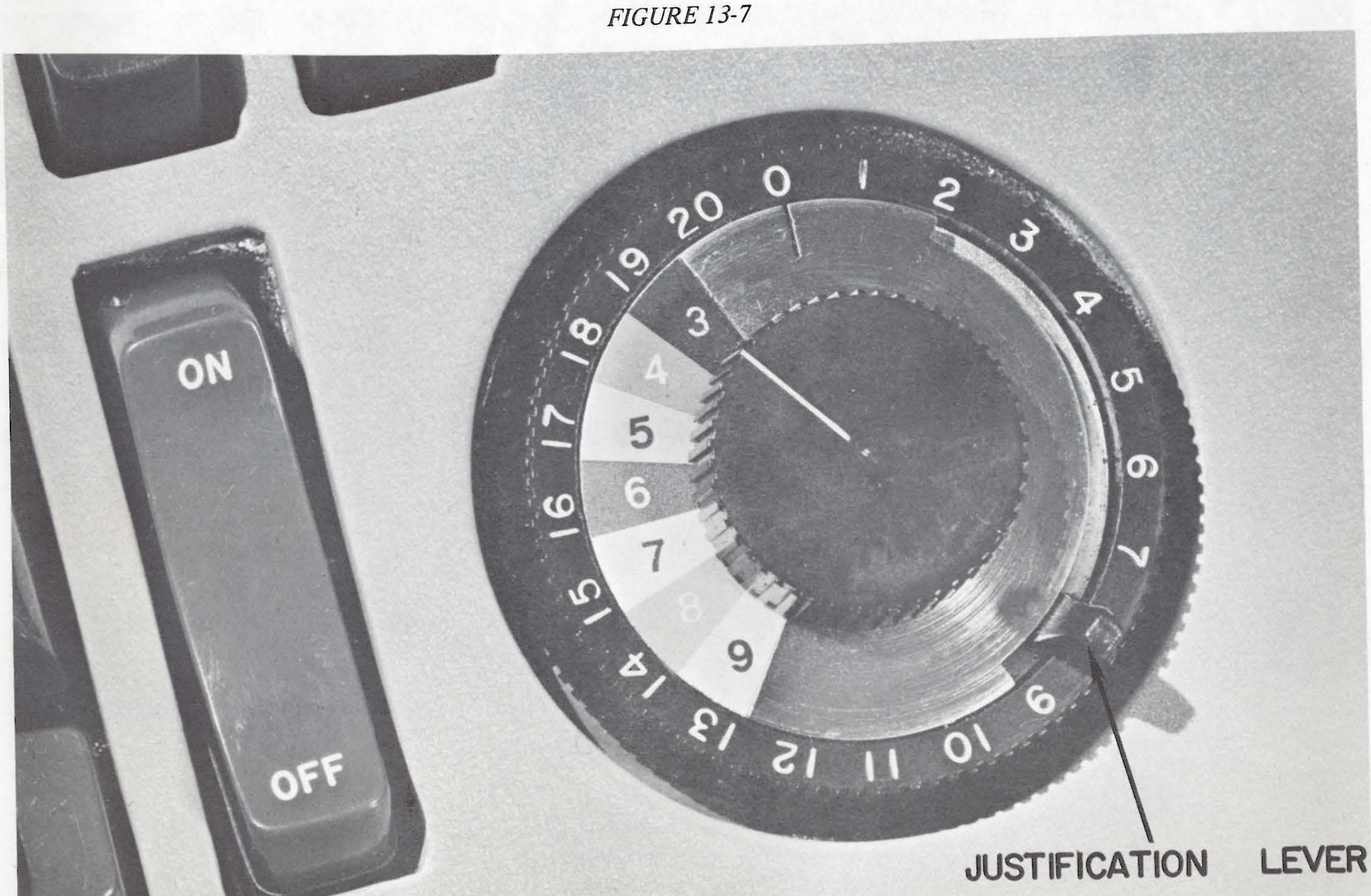


FIGURE 13-8

spacebars in the line she will only gain 26 units. To gain the additional 3 units she must increase the first three spacebar operations by one more unit or to a value of 6 units. After the third spacebar operation the spacebar value dial must step down to a 5 unit value and remain there for the following ten spacebar operations. The settings required to produce these results should be "green-three"; a setting of green on the value dial and three on the quantity dial.

Once a line has been justified, the operator depresses the carrier return keybutton, pulls the justification lever back into its "read" mode, and then begins typing the rough copy of the next line to be justified. The justification data for the second line is read from the tube and the process of justifying is repeated in the same manner as the first line.

If when typing the rough copy to generate the justification data the length of the line should just happen to come out to the correct length the data will appears as: the last color (blue) will be completely concealed by the indicator tube and the white line representing the right hand margin will cut the "zero" gradient mark on the indicator scale.

"READ" MODE OPERATION

The justification lever (Fig. 13-8) provides the operator with a means of controlling the justification

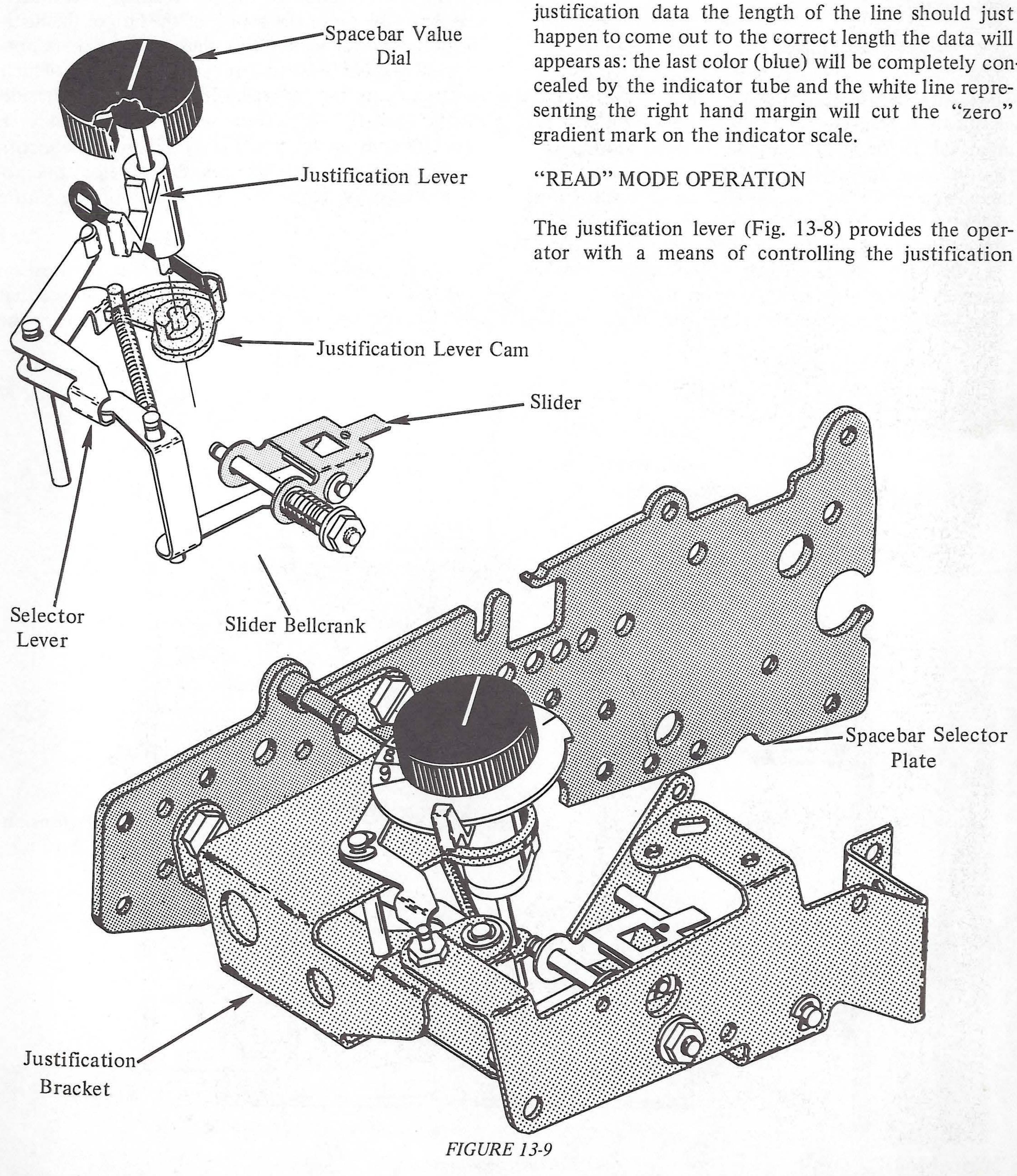


FIGURE 13-9

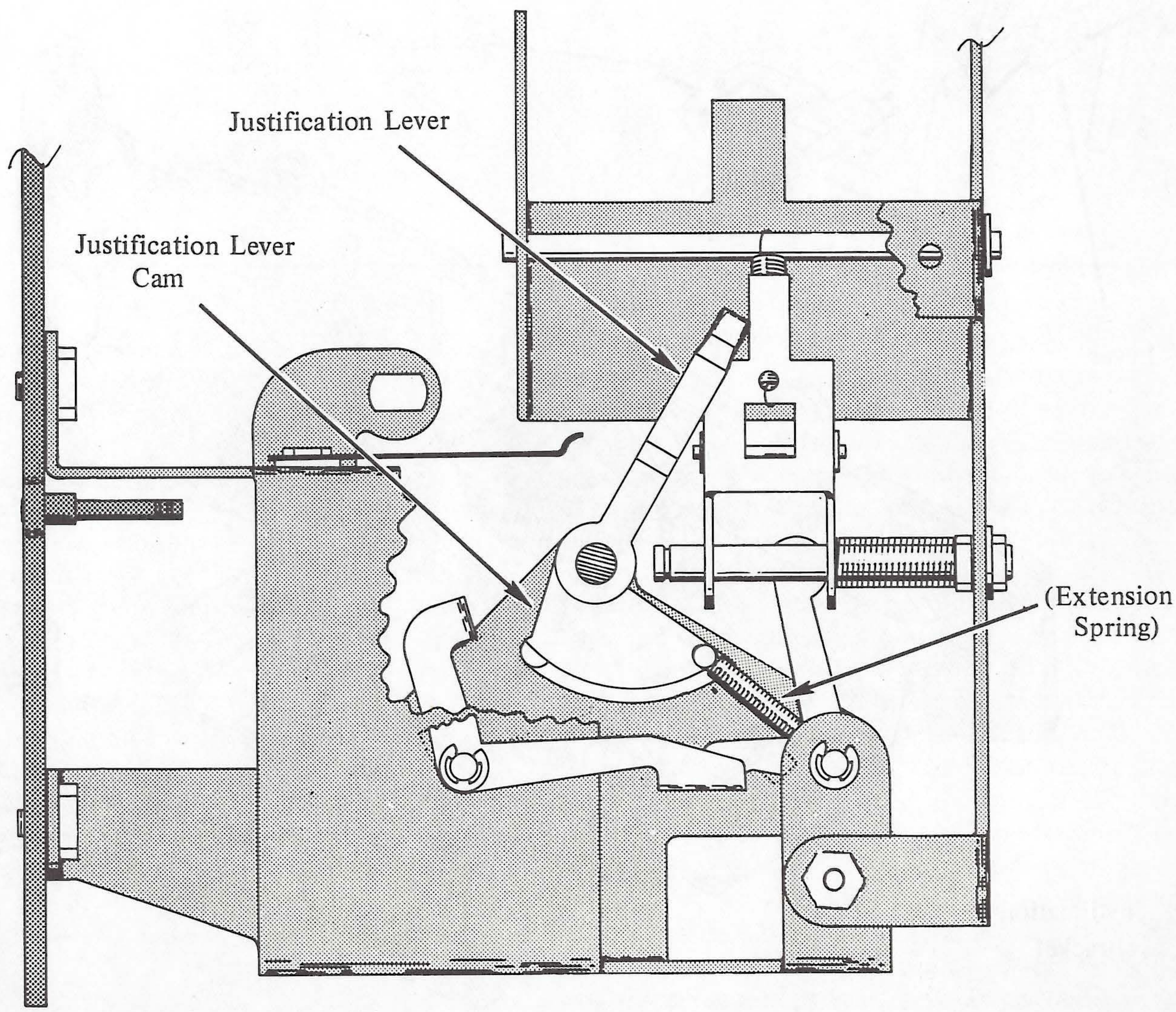
"read-write" mode of the "Selectric" Composer from the keyboard. Whenever the lever is pulled clockwise into its detented position, it will cause both the variable spacebar and justifier mechanism to be placed in a "read" mode. This means that the variable spacebar will be returned to a 3 unit value setting and that the justifier mechanism will be conditioned to produce the necessary justification data required to justify a line of type.

1. "Read" Selection

The justification lever pivots freely inside a hub on the justification bracket (Fig. 13-9). The lever is free to pivot within the range provided by the cut away portion in the spacebar selector plate. This plate fits over the outside of the hub on the justification bracket and is held in place by two set screws. Pulling the justification lever into its "read" position causes the spacebar value dial to swing to its 3 unit setting. This is achieved through a vertical lug on the justification lever which extends up through a curved slot in the selector plate into a channel in the underside of the spacebar value dial. As the justification lever swings to its "read" position the vertical lug picks up the value dial rotating it to the three unit setting. The various mechanical actions that occur in getting the 3 unit escapement selection to the pinwheel will be brought out under the "write" mode explanation.

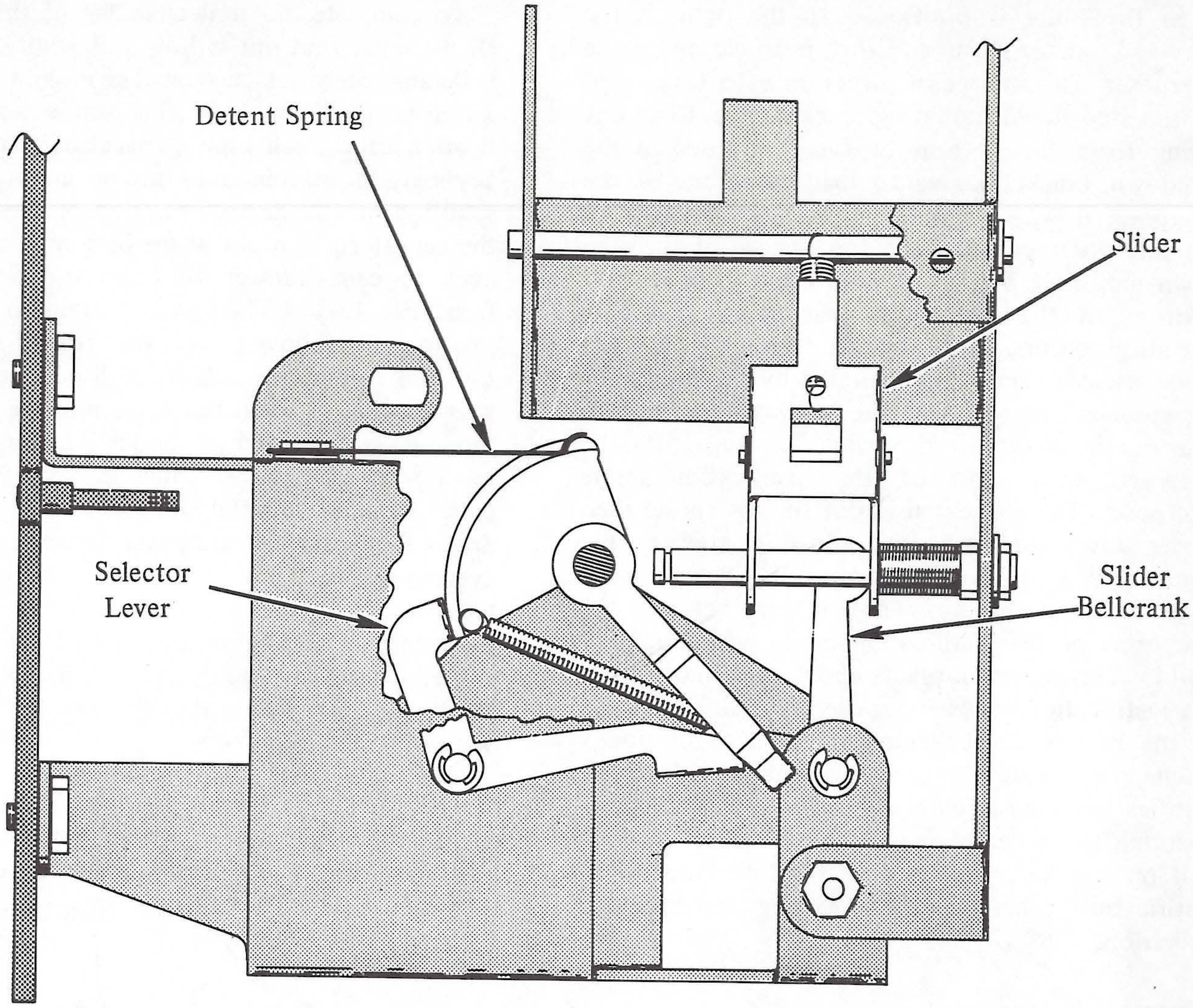
The shaft portion of the justification lever which extends down into the center of the hub of the justification bracket locks or meshes with the shaft portion of the justification lever cam (Fig. 13-9), which protrudes up into the same hub from the underside of the bracket. The position of the justification lever directly controls the rotational position of the justification lever cam. It is this cam that develops the motion necessary to change the mode of the entire system.

Looking down at the top of the justification bracket as shown in Figure 13-10A, you can see that the justification lever cam is spring loaded in the



"Write Mode"

FIGURE 13-10A



"Read Mode"

FIGURE 13-10B

counterclockwise direction. If the justification lever is rotated into its "read" position, the cam will rotate clockwise against its extension spring. As the cam is rotated to its limit a leaf type spring, which is loaded against a small vertical nub on the cam, detents the justification lever and cam in this position (Fig. 13-10B). The clockwise rotation of the cam will cause the lower arm of the selector lever (Fig. 13-9), which rides against the camming surface, to move to the left or pivot in the counterclockwise direction. The right hand portion of the selector lever moving towards the rear causes the slider bellcrank to pivot in the clockwise direction. This rotation of the slider bellcrank then causes the slider to shift to the right on its mounting stud. A compression spring, to the right of the slider, serves to restore the slider back to the left whenever the mechanism permits. Ultimately, it is the shifting of this slider that controls the "read-write" mode of the mechanism. Whenever the slider is shifted to the right by the action of the justification lever cam the justifier and variable spacebar mechanisms will be in a "read" mode.

When the mechanism is placed in the "read" mode, the objective of the mechanism is to count the number of spacebars that occur within a typed line and then sense the position of the carrier when it has stopped in the justification zone. Let's begin at the slider, which has been shifted to the right, and examine how this slider position conditions the mechanism to count spacebars. Each time a spacebar is struck the spacebar interposer in the keyboard is driven forward by the filter shaft. As this interposer comes forward it rotates the spacebar value shaft top to the front (Fig. 13-11). Set screwed to the right hand end of this shaft is a cam called the mode selector cam. This cam, which is positioned directly under the slider assembly, causes the rear of the slider to rise during the early portion of each spacebar operation. A pin running laterally through the slider rides on the cam and functions as the cam follower. An extension spring loads the assembly down at the rear against the cam.

Positioned directly above the rear tab on the slider

when the slider is positioned to the right, is the forward extension of the justification mode interposer. This interposer pivots on a shaft mounted on the step down mounting bracket (Fig. 13-11). A spring from the bottom of the interposer to the stepdown bracket serves to load the front of the interposer down. A lug extending from the right of the interposer contacts the top surface of the step down mounting bracket thereby controlling the rest position of the interposer. Whenever a spacebar operation occurs, while in the "read" mode, the mode selector cam, being operated by the motion of the spacebar interposer in the keyboard, causes the rear of the slider to rise which in turn lifts the forward extension of the justification mode interposer. The rear extension of this interposer then moves down contacting the adjusting screw on the lever causing the justification mode lever to pivot about its mounting pin. This pin runs between the two arms of the justification mode bellcrank (Fig. 13-11). This bellcrank pivots about the same shaft as the justification mode interposer. The link attached to the rear of the bellcrank connects to the index mechanism located on the right hand end of the justification tube assembly. Each time a spacebar is operated this bellcrank must rotate down producing a pull on the link. The pull on the link indexes the justification tube, thereby counting the spacebar operation.

To complete our understanding of this operation all we must find out is how this justification mode bellcrank receives its motion. The motion comes from a cam on the filter shaft. This cam is called the justification cam. Each time a spacebar is struck at the keyboard the machine goes through a "no print" cycle resulting in 180 degrees rotation of this cam. When the cam starts to rotate at the beginning of a spacebar cycle its cam follower will begin to pivot top to the front (Fig. 13-12). The forward extension of the justification cam follower has a stud riveted to its tip. As the cam rotates towards its high point this stud begins to move down. If the left arm of the justification mode lever is latched on the justification mode latch as shown in Figure 13-12, then the lever will be in the path of the stud on the cam follower. The filter shaft drives the spacebar interposer forward early in the cycle which in turn rotates the justification mode lever into its active position. Since the justification cam start its rise approximately half way through the cycle, a means of latching the "j" mode lever into its active position under the "j" cam follower stud is necessary.

This latching action is provided by the "j" mode latch, which mounts and pivots about the same stud that mounts the justification cam. As the "j" mode

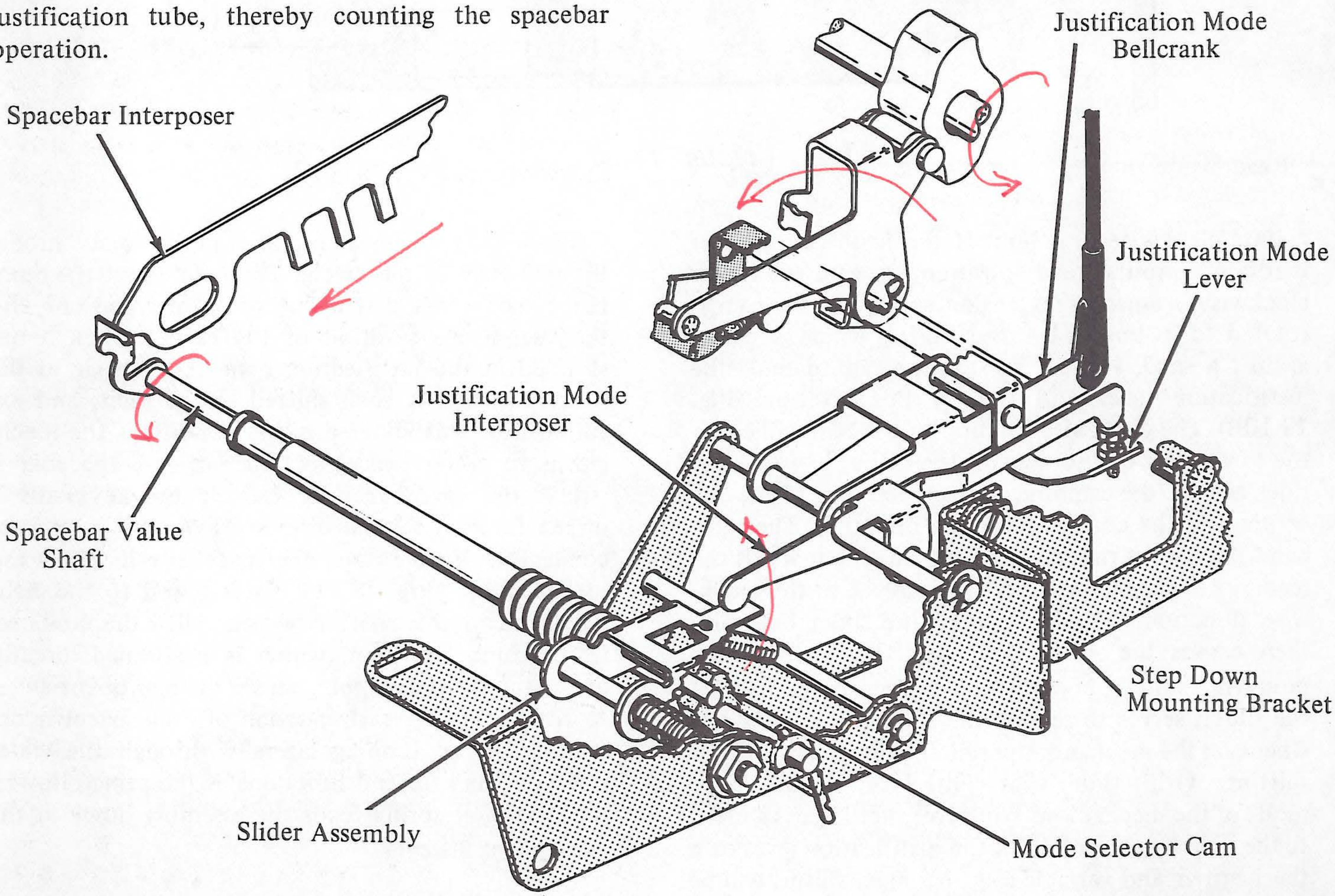


FIGURE 13-11

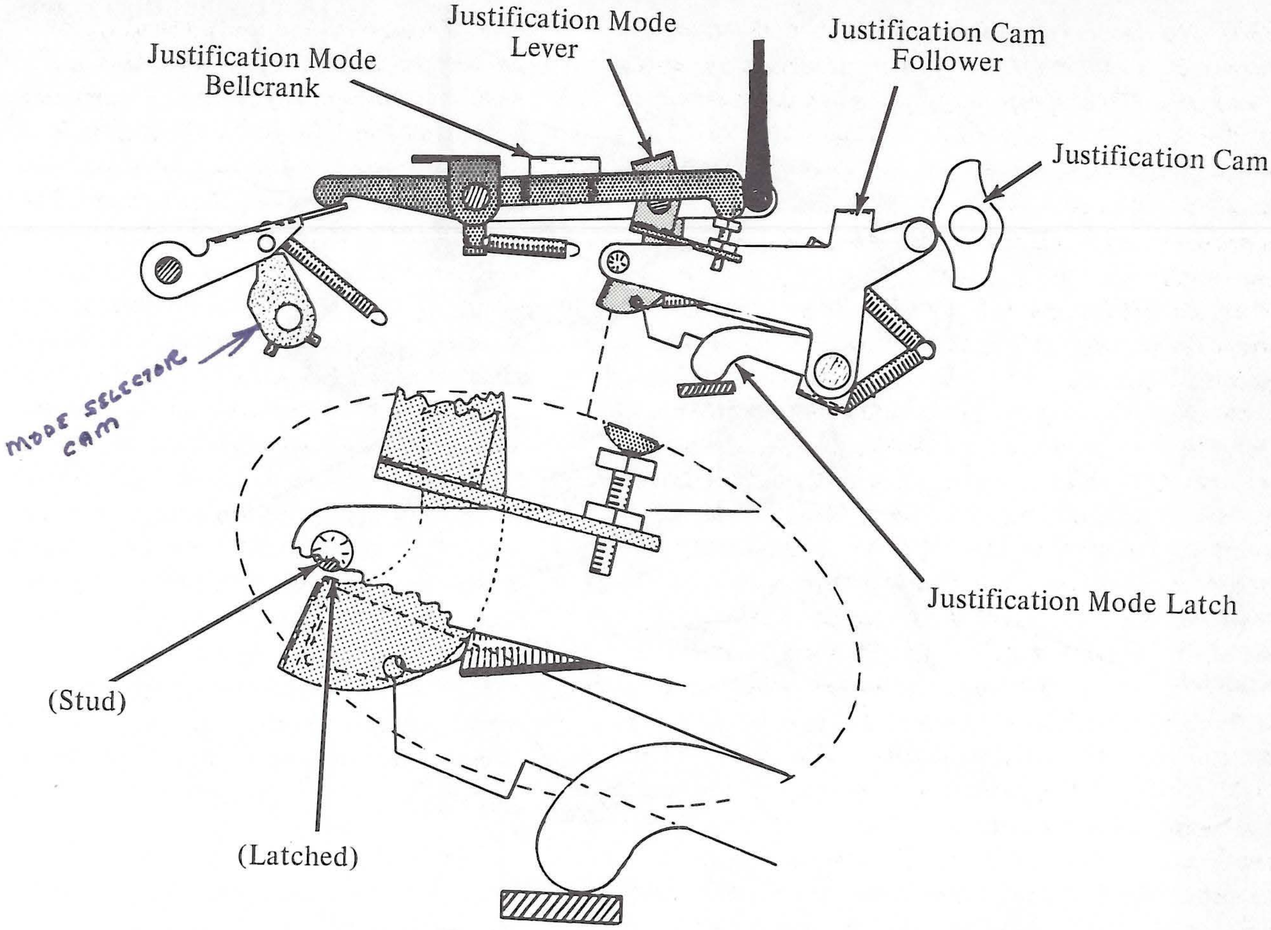


FIGURE 13-12

lever is driven top to the rear the lower extension moves forward under the stud on the "j" cam follower and also in front of the "j" mode latch allowing the latch to snap down behind the lever, latching the "j" mode lever into its active position. This assures the "j" mode lever will remain in its actuates position until the "j" cam has almost reached its high point.

If the left arm of the justification mode lever isn't latched on the mode latch when the stud on the cam follower begins to sweep down then the stud would completely miss the "j" mode lever and no movement to the bellcrank would result.

Let's go back to the beginning and review what has happened to this point. Pulling the justification lever to the "read" position causes the slider to shift to the right into a position that will be directly under the forward tip of the justification mode interposer. When the spacebar interposer in the keyboard is driven forward by the filter shaft, it rotates the value shaft which in turn, via the mode selector cam, causes the slider to rise at the rear. As the slider rises it lifts the forward extension of the justification mode interposer causing its rear extension to push down on the right hand arm of the justification mode lever. The left hand arm swings forward and latches on the justification mode latch. Now, when the stud on the cam follower begins to sweep down, it contacts the left arm of the "j" mode lever causing it and the "j" mode bellcrank to rotate as one piece. A pull on the link results and the spacebar operation is accounted for.

The only point left to be explained in this area is how the justification mode lever is unlatched from the mode latch before the mechanism restores back to rest. This unlatching is accomplished simply through a knock-off operation. As the justification cam operates towards its high point the "j" mode lever is pivoting down in front with the "j" cam follower. The mode latch is not free to move down because its right hand extension is resting upon a lug on the step down mounting bracket. Since the latch cannot move and the lever continues to move downward the lever disengages itself from the latch just before the cam reaches its high point. The "j'. mode lever rotates C.C.W. under the mode latch. When the "j" mode bellcrank and the "j" mode lever restore upward the lever also carries the latch up with it to its rest position. Once the cam has passed over its high point, all parts are restored to their rest position by their restoring springs (Fig. 13-13B). The spring loading of the justification mode bellcrank comes through the justification indexing link.

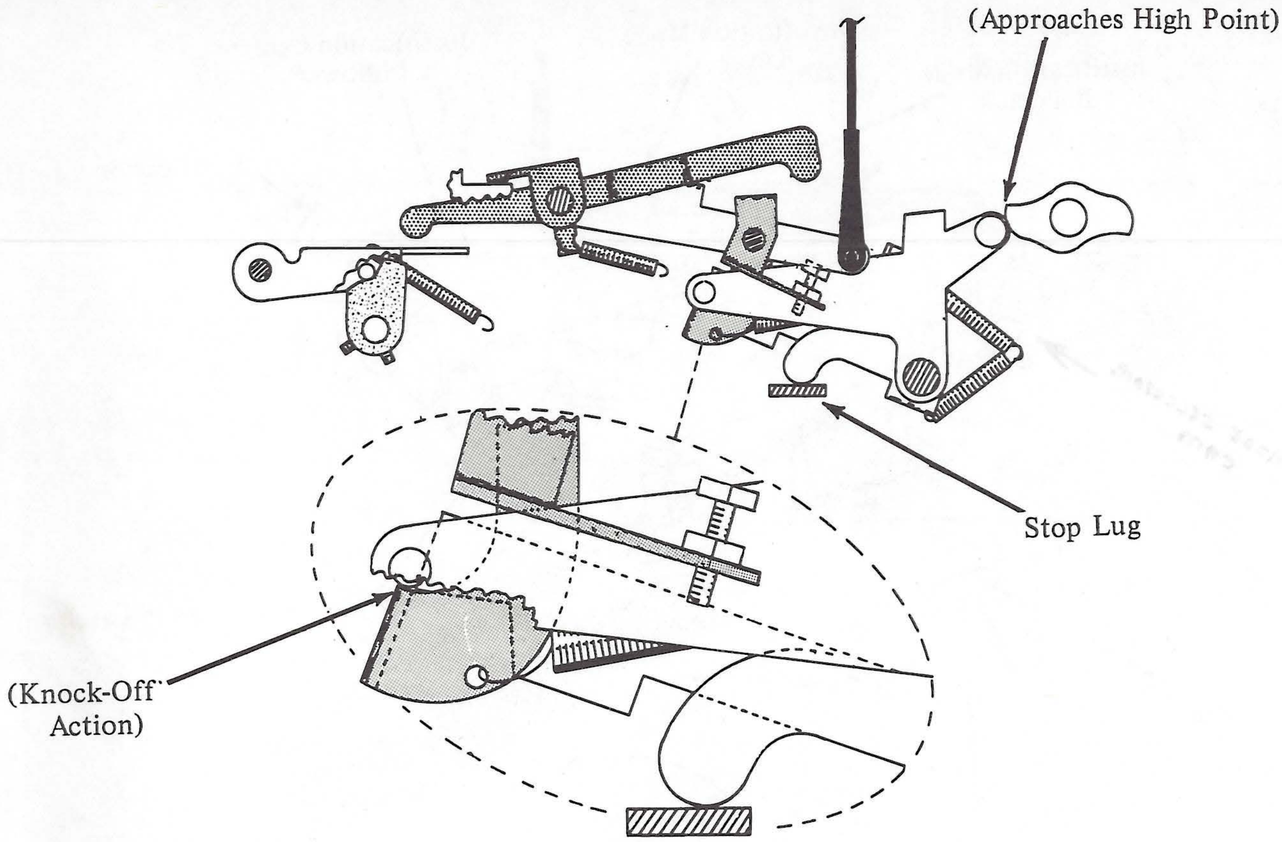


FIGURE 13-13A

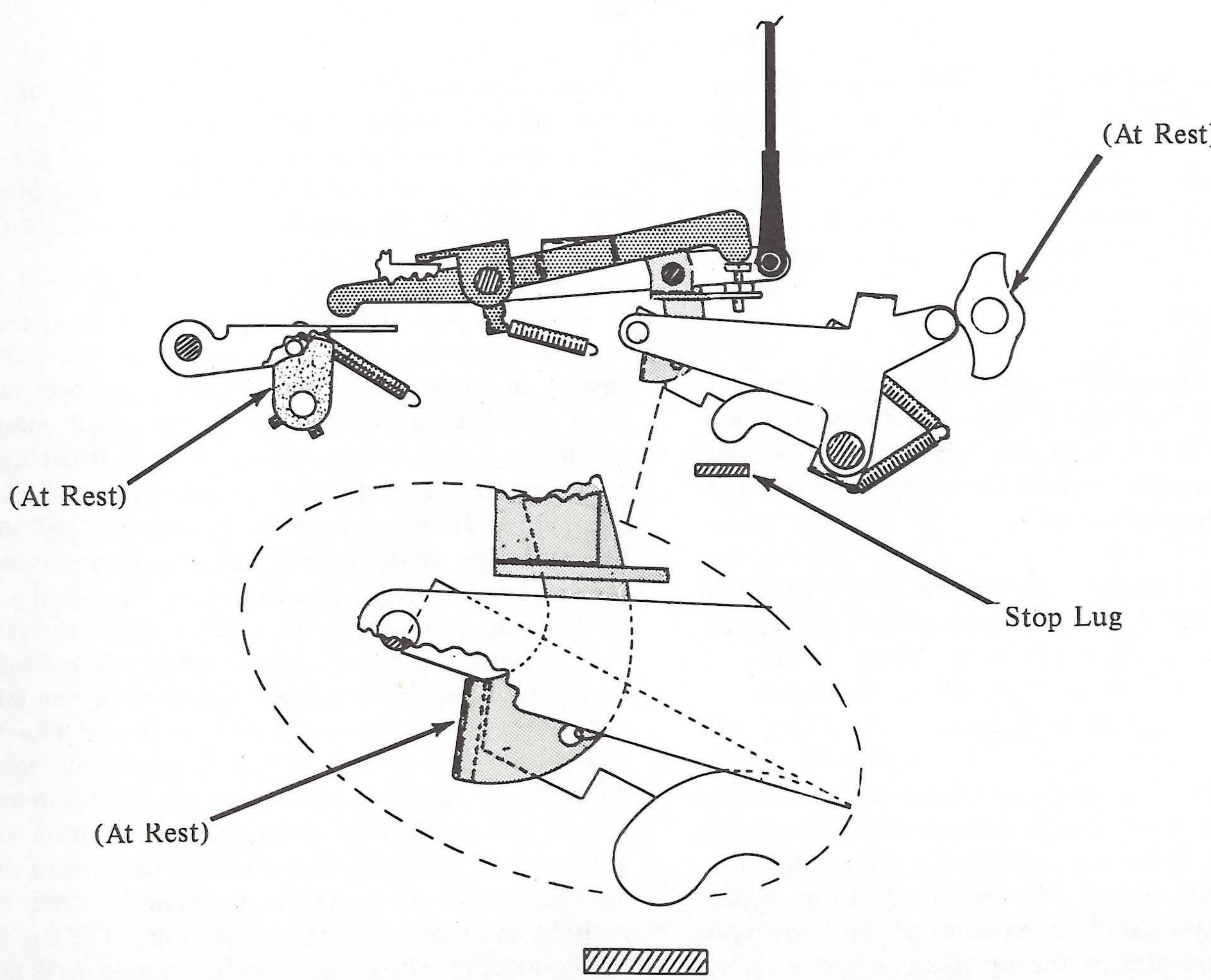


FIGURE 13-13B

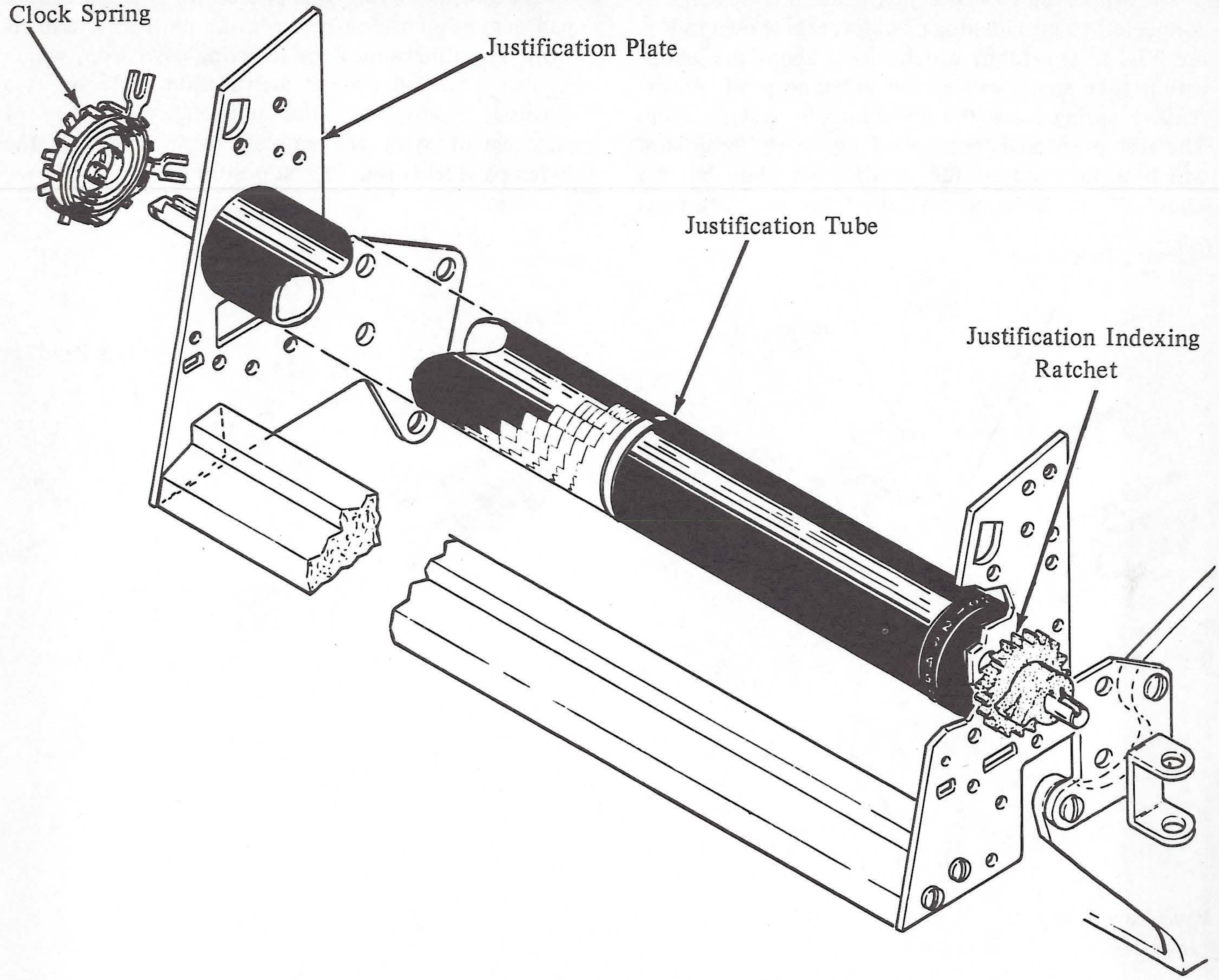


FIGURE 13-14

Up to this point you should understand that each time a spacebar operation occurs in a "read" mode, a pull on the justification indexing link will be produced. This link action provides the motion required to index the justification tube. The indexing of the tube positions a new color bar in line with the indicator window, thereby compensating for the effect that a spacebar operation places on the justification data.

2. Justification Tube Indexing

The justification tube mounts directly above the margin racks and runs laterally across the entire width of the machine. It is supported at each end by large plates which are fastened to the machine powerframe (Fig. 13-14). A clock spring mounted on the outside of the left hand justification plate provides the rotational spring load necessary to rotate the justification tube back to rest when desired. The outer loop of the spring is secured to its cage which is anchored to the left hand justification bracket by two screws. The innermost loop of the spring is secured to the justification tube shaft. The end of the spring is rolled, forming a hook which fits into the keyway slot in the tube shaft.

An indexing ratchet is mounted on the right hand end of the justification tube. It is set screwed to the tube shaft on the outside of the right hand justification plate. This ratchet, called the justification indexing ratchet, is keyed to the shaft by a key which is an internal part of the ratchet, thereby assuring a fixed relationship between the ratchet and justification tube. Indexing of the tube is achieved by feeding the ratchet one tooth at a time. This is done with a common pawl type feed arrangement.

The upper end of the justification index link is connected to an indexing pawl lever, as shown in Figure 13-15. This lever, which pivots about the justification tube shaft, carries the indexing pawl. An extension spring loads the lever into its rest position. The rest position is controlled by a pawl lever stop which is fastened to the justification plate by two screws. It is the same plate that the indexing pawl lever restoring spring is anchored to. A small rubber pad acts as a cushion between the pawl lever and its stop. The function of the indexing pawl stop, which is also mounted on the justification plate by two screws, is to hold the indexing pawl out of engagement with the ratchet teeth whenever the index pawl lever is in its rest position.

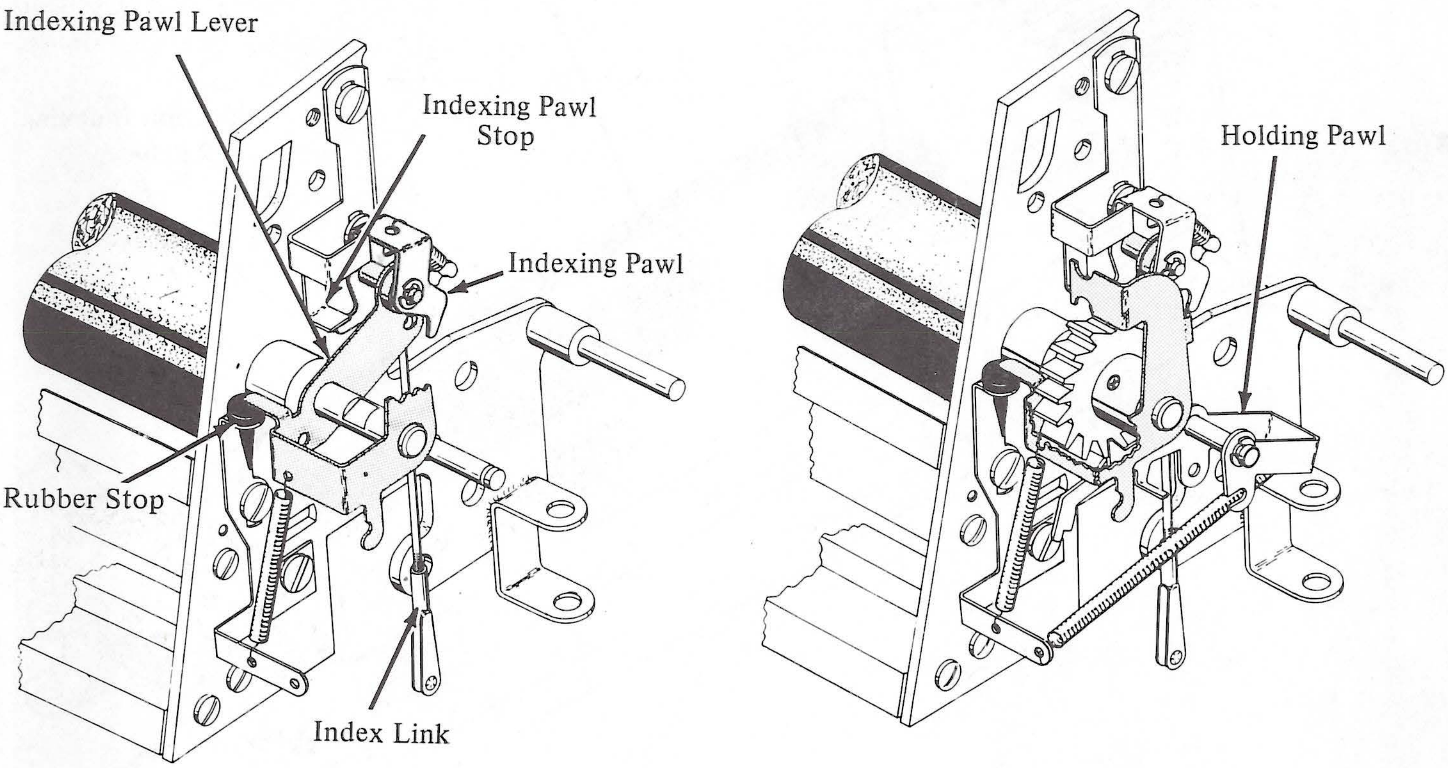


FIGURE 13-15

Let's run through the action now while looking at Figure 13-16. As a downward pull is produced on the indexing link, it causes the index pawl lever to begin to rotate in the clockwise direction. As the indexing pawl begins to move down its spring swings the pawl tip into engagement with a ratchet tooth. Further movement of the link causes the index pawl to feed the ratchet. This rotation is in the direction that will wind up the clock spring attached to the other end of the tube. As the indexing link approaches its limit of travel, the indexing ratchet should be rotated far enough for the holding pawl to be cammed over one ratchet tooth and reset in the next. The indexing pawl may now restore as the holding pawl is ready to hold the ratchet in its new position. As the indexing link is permitted to restore back to rest, the inner arm of the indexing pawl comes in contact with the indexing pawl stop causing the pawl to swing out of engagement with the index ratchet. This restoring action for the mechanism comes from the indexing pawl lever restoring spring.

Due to inherent momentum of the ratchet and tube, a means must be provided to prevent overthrow. The overthrow latch, which is spring loaded, to follow the indexing pawl lever, and the holding pawl serve to prevent this overthrow (Fig. 13-16). As the indexing link pulls downward the pawl lever and overthrow latch pivot top to the rear on the justification tube shaft moving the indexing pawl into engagement with the ratchet. As the ratchet rotates, the holding pawl which is mounted on a stud on the justification plate drops into the next holding tooth. As the holding pawl drops into the tooth the overthrow latch moves forward under its spring load beneath the latching surface on the forward extension of the holding pawl (Fig. 13-17). This prevents any further motion of the ratchet since the holding pawl cannot be cammed out of the tooth until the overthrow latch unlatches as the indexing link begins to restore.

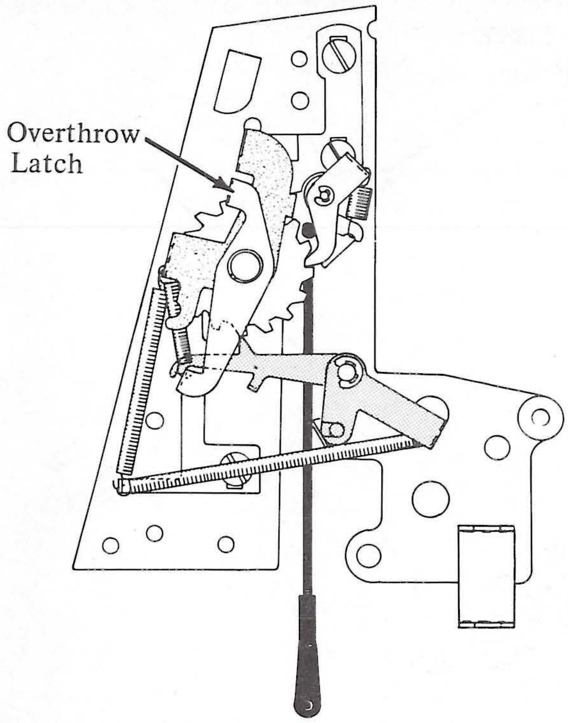


FIGURE 13-16

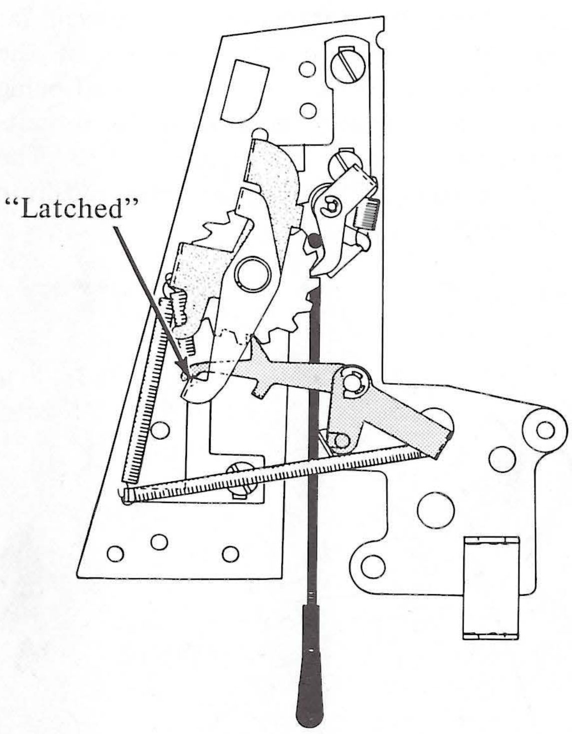


FIGURE 13-17

Since there are only 20 color bars on the justification tube, the indexing mechanism has been designed to provide a maximum of 20 index operations. The ratchet, which has a total of twenty-one teeth, has its twenty-first tooth ground off in the area where the indexing pawl would feed. Whenever the mechanism attempts to feed to the twenty-first tooth the feeding action does not occur.

3. Justification Tube Homing

Before beginning to justify another line the justification tube must be returned to its zero position. Each time the operator initiates a carrier return operation the holding pawl is disengaged from the ratchet allowing the clock spring at the left end of the tube to rotate the tube back to the zero position. The motion required to pivot the holding pawl out of engagement with the indexing ratchet is taken from the carrier return mechanism.

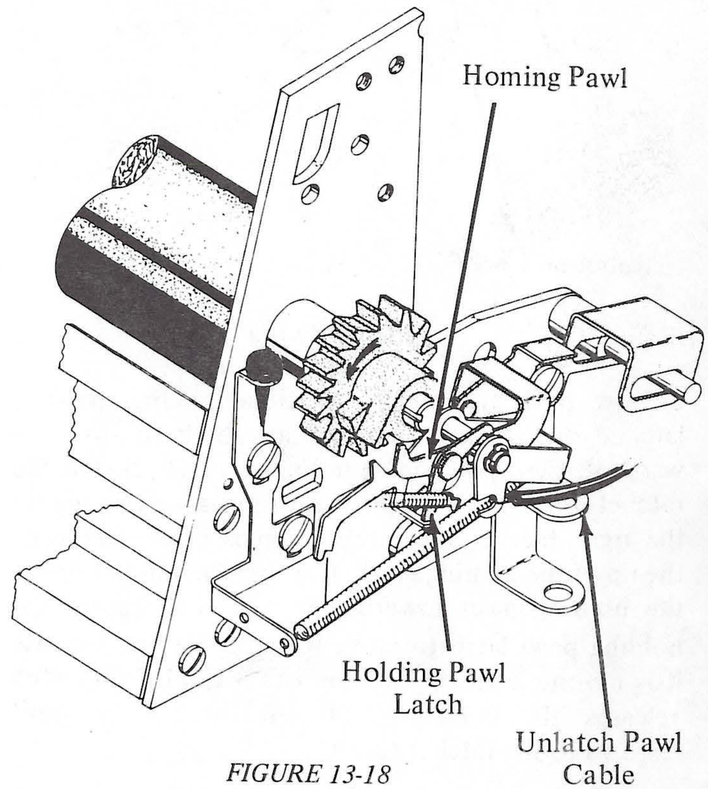


FIGURE 13-18

A sheathed cable serves as the motion transmitting device between the carrier return mechanism and the holding pawl. This cable is called the unlatch pawl cable. When a pull is produced on the cable the holding pawl tip begins to move down disengaging itself from the indexing ratchet (Fig. 13-17). Once the holding pawl clears the ratchet the holding pawl latch, which is mounted on the homing pawl, swings into a position directly above a lug on the holding pawl. When the pull on the cable is relaxed the holding pawl latch will keep the holding pawl disengaged from the ratchet as shown in Figure 13-17.

The homing pawl, made in two pieces for adjustment purposes, mounts on two guide studs as shown in Figure 13-17. The mounting holes are elongated so that the homing pawl can slide front or rear. The extension spring that loads the holding pawl latch also serves to load the homing pawl into its forward

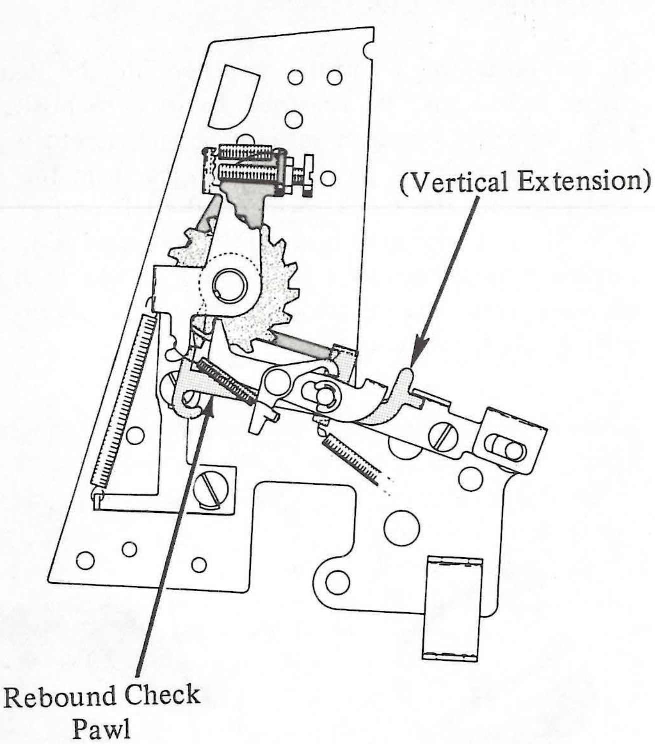


FIGURE 13-19A

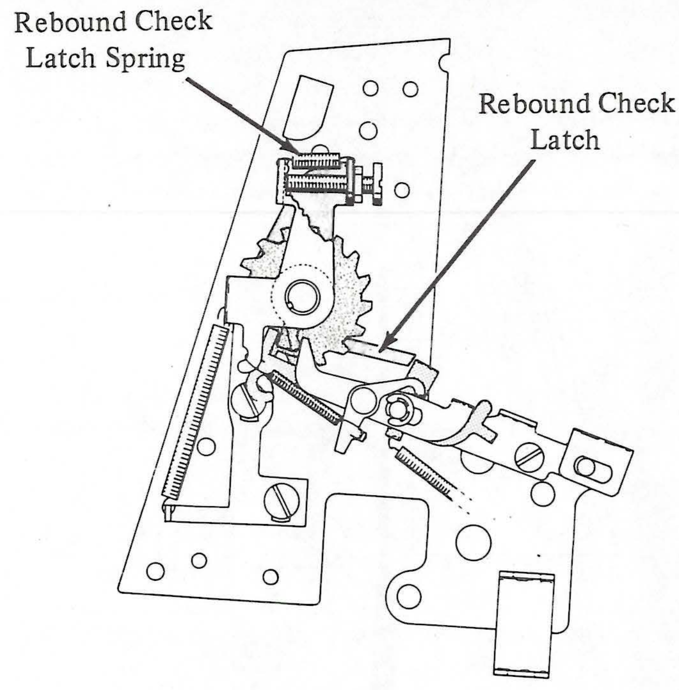


FIGURE 13-19B

or rest position. Assume that the holding pawl is latched out and the justification tube is rotating towards its zero position as in Figure 13-18. Just as the ratchet approaches the zero position a homing lug on the right face of the ratchet comes in contact with the tip of the homing pawl. The rotating ratchet drives the homing pawl towards the rear. This causes the holding pawl latch to move towards the rear because it is mounted on the homing pawl. The holding latch releases the holding pawl and the holding pawl restores to the ratchet tooth.

When the homing pawl is being driven toward the rear, it pushes on a vertical extension of the rebound check pawl (Fig. 13-19A). This action causes the rebound check pawl to cam top to the rear swinging its forward extension up behind the homing lug on the ratchet as shown in Figure 13-19B. To assure that the rebound check pawl will still be there once the ratchet begins to rebound, a latch called the rebound check latch latches the pawl in its active position. This latch mounts and pivots on the justification tube shaft. It is spring loaded in the top to the front direction by a small extension spring which is anchored to the upright arm of the indexing pawl lever. When the rebound check pawl is in its rest position the latching arm of the latch rests against the underside of a formed lug on the rebound check pawl. This lug is located just above the pivot point of the rebound check pawl (Fig. 13-19A). When the rebound check pawl begins to rotate towards its active position, this lug begins to move toward the rear with respect to the latching arm of the rebound check latch. Once the formed lug has moved far enough toward the rear to clear the end of the latching arm the top to the front spring load being applied to the latch causes the arm to rise into its latched position as shown in Figure 13-19B. The rebound check pawl will stay in its active position trapping the ratchet at zero.

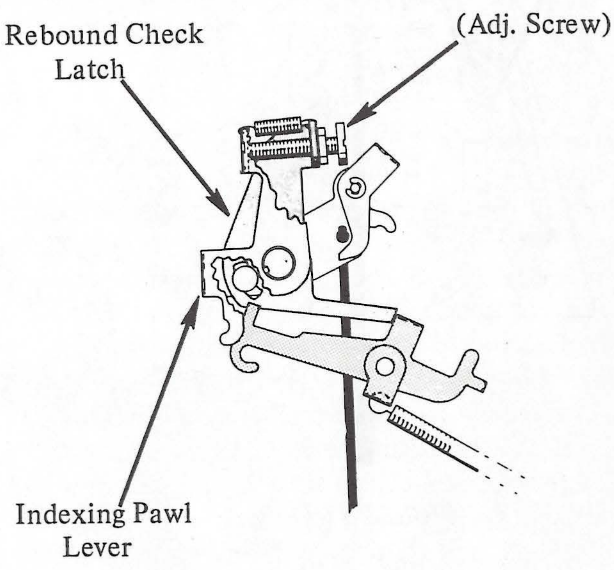


FIGURE 13-20

On the first feed operation, which is initiated by the operation of the spacebar, the pull produced on the justification indexing link will rotate the indexing pawl lever. The upright arm of this lever pushes on the adjusting screw in the vertical arm of the rebound check latch causing it to rotate top to the rear (Fig.

13-20). This rotation causes the latching arm of the rebound check latch to move down releasing the rebound check pawl. The pawl is then restored to its rest position by its restoring spring; further downward movement of the indexing link causes the indexing pawl to swing into engagement with the ratchet and a normal feed operation occurs.

Let's quickly summarize the major events that have occurred in this area:

a. The feed mechanism is designed to limit the number of index operations to a maximum of 20.

b. A carrier return operation produces the motion to initiate a tube homing operation.

c. During a tube homing operation the holding pawl is latched out of the ratchet.

d. The homing pawl senses the zero tube position and unlatches the holding pawl permitting it to re-enter the ratchet.

e. The homing pawl then powers the rebound check pawl into engagement with the ratchet.

f. Rebound check pawl latches in its active position trapping the ratchet in the zero position.

g. The first spacebar or feed operation unlatches the rebound check pawl permitting the feed cycle to begin again.

4. Carrier Position "Read" Operation

The justification zone begins approximately three quarters of an inch from the setting of the right hand margin regardless of where the margin has been set. This zone is the only area where the indicator tube assembly can read the carrier's position and reflect it back to the operator in the form of justification data. The carrier's position read will always be with respect to the right hand margin. Every time the carrier enters the justification zone it mechanically tells the indicator tube assembly to begin reading the carrier's position, and rings the bell to alert the operator that the carrier is in the justification zone. Once the operator has selected a convenient stopping place for the carrier within the justification zone, she then reads the justification data that is being reflected by the tube assembly. Applying this data to the variable spacebar mechanism and then retyping the line will cause the line to be automatically justified.

The carrier's position in the justification zone is read by merely letting the carrier's escape movement control the lateral position of the indicator tube assembly. The lateral position of the indicator window in the indicator tube with respect to the color bar that has been placed in line with the window then indicates the data that must be used to justify the line. In other words, as the carrier is escaping to the right along the writing line, the indicator window is sliding to the right across the color bar indicating the carrier's position.

Since the carrier's movement is measured in units and these units can be as small as one ninety-sixth of an inch, it is necessary to amplify the carrier motion before applying it to the indicator tube assembly. One ninety-sixth of an inch increments are much too small for the operator to read easily and accurately. Therefore, each increment or unit of motion of the carrier is amplified three-fold before applying it to the indicator tube assembly. This makes the indicator window movement register in increments of 1/32 of an inch if the 1/96 pitch is used, 1/28 of an inch if the 1/84 pitch is used, and 1/24 of an inch if the 1/72 pitch is used. Each one of these can be read easily by the operator.

The carrier position "read" operation occurs basically in this manner. The indicator tube is held latched to the left of the justification zone. It is spring loaded to the right in the same direction that the carrier escapes. As the carrier escapes along the writing line, it enters the left end of the justification zone. At this time the carrier unlatches the indicator tube permitting it to catch up to the carrier. The tube is spring loaded against the carrier. All movement of the carrier now in the justification zone will control the movement of the indicator tube laterally across the color bars. Wherever the carrier stops within the zone the indicator window will reflect, by means of its lateral position on the exposed color bar, the carrier's position with respect to the right hand margin. It will reflect it in the form of data which can be applied to the variable spacebar mechanism.

The indicator window is nothing but a rectangular hole in a sleeve which fits freely around and slides on the justification tube. This sleeve, called the indicator tube, has a transfer rack fastened to its bottom edge (Fig. 13-21). The rack is secured to two support rings which encircle each end of the indicator tube. A long extension spring, fastened to the left end of the transfer rack and anchored to a stud on the right hand end of the margin set scale, loads the rack and indicator tube assembly towards the right (Fig. 13-21).

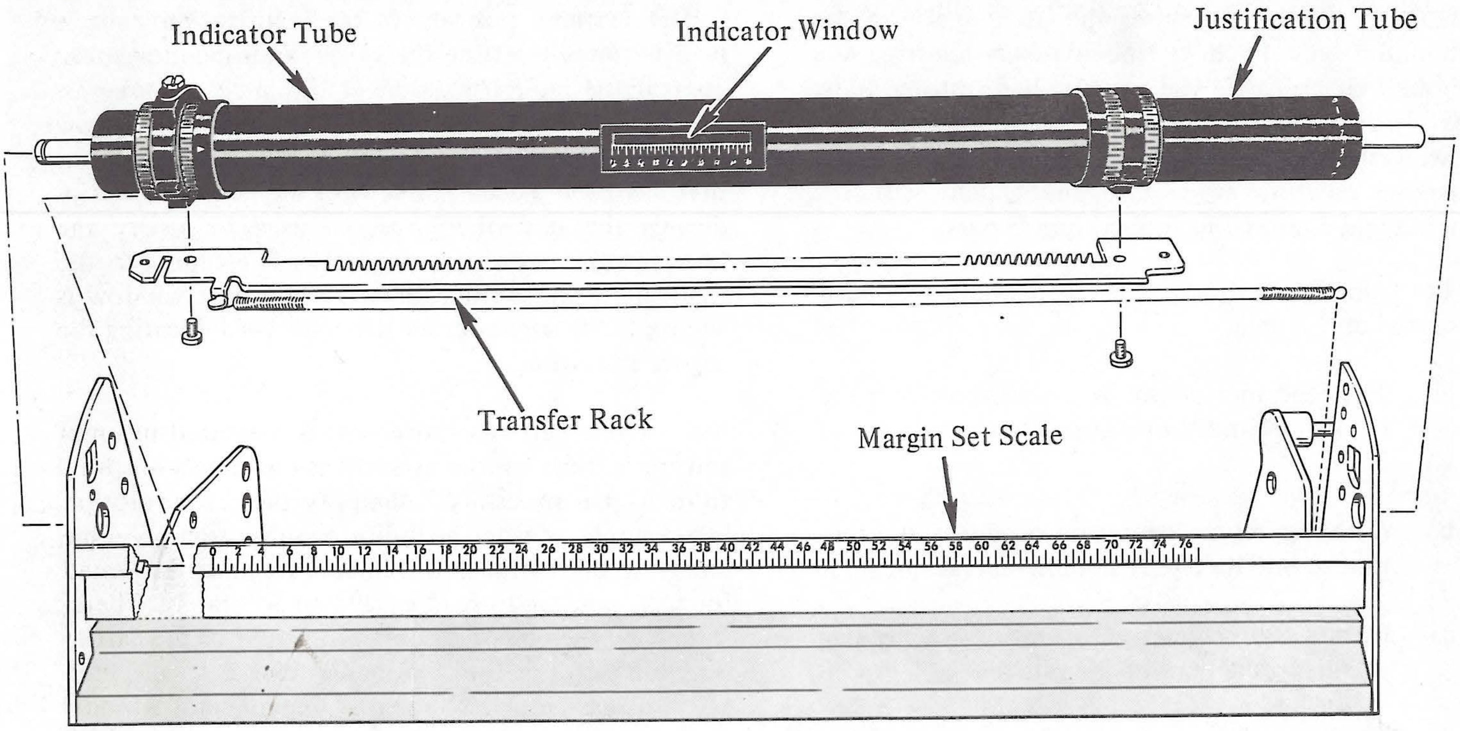


FIGURE 13-21

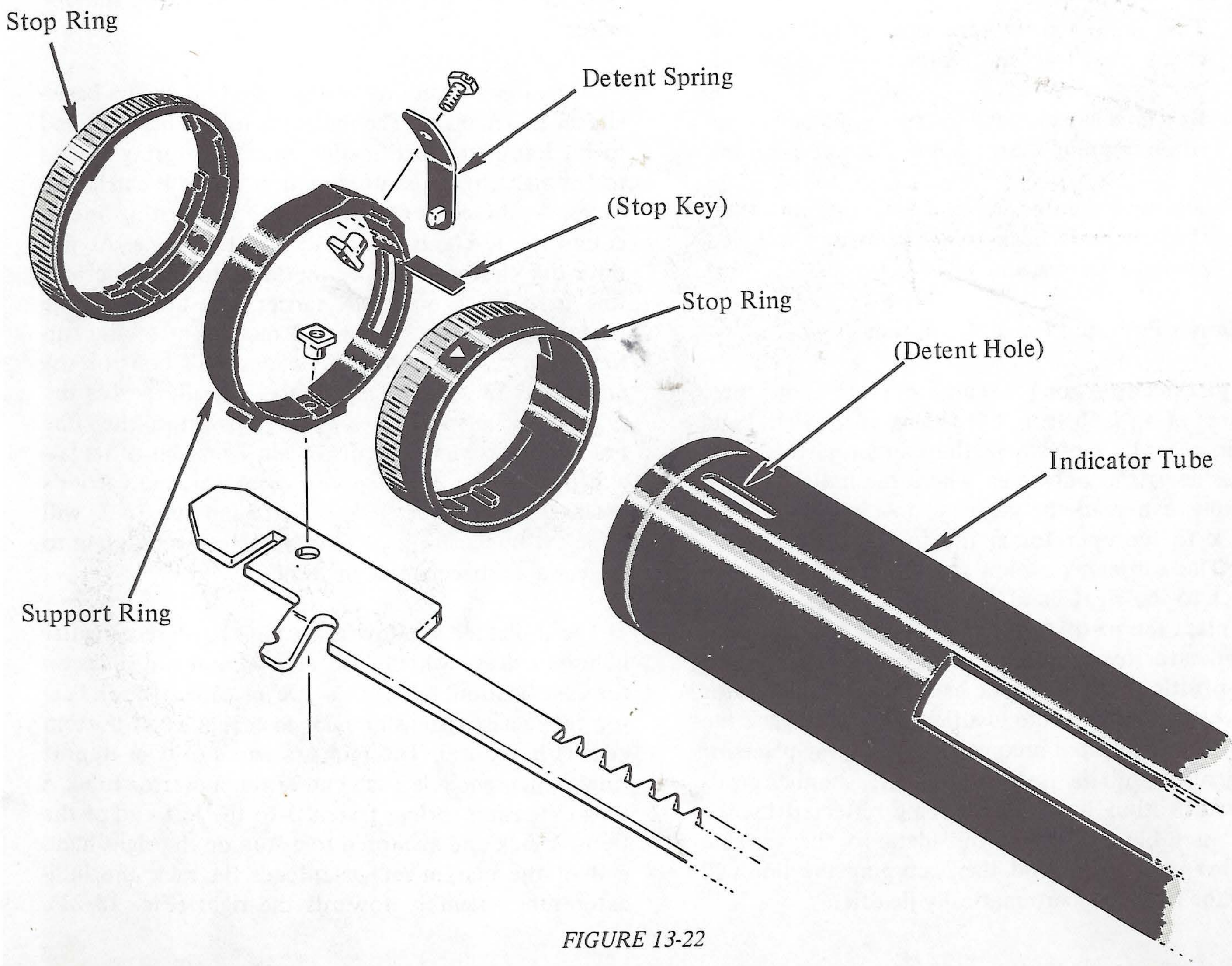


FIGURE 13-22

The indicator tube is designed so that the operator may rotate it within its support rings. This is necessary because the indicator tube has three indicator windows; one corresponding to each escapement pitch. The graduated scale, called the indicator scale, located along the bottom edge of the window must correspond to the escapement pitch selected in order to accumulate the correct justification data. As the operator rotates the indicator tube into position a detent spring, mounted to the backside of the left hand support ring, will detent the tube in position (Fig. 13-22).

The right hand end of the indicator tube is threaded on the outside. Two rings, one on each side of the support ring, are locked together and rotate freely with respect to the support ring. The left hand ring which is threaded on the inside, threads onto the indicator tube and is called the adjustment ring (Fig. 13-23). Its purpose is to provide the operator with a vernier adjustment of the tube. Rotation of either ring, because they are locked together, will cause the indicator tube to move left or right beneath its support rings. The operator must make this small vernier adjustment each time she changes the escapement pitch of the machine and/or each time she changes the right hand margin because of tolerances. Effectively what she is doing is bringing the indicator scale into proper registration with the color bar on the justification tube. A small black detent spring screwed to the right end of the transfer rack rides against the serrations of the adjustment ring. It assures that the tube will hold its adjustment during machine vibration. The two stop rings located on each side of the left hand support ring function to limit the range of the vernier adjustment (Fig. 13-22). They also limit the rotation of the indicator tube to 270 degrees during an indicator tube pitch change. This prevents the operator from accidentally jamming the tube against the support ring during a pitch change. Color coding on the right hand stop ring is used to match the setting of the tube to the escapement pitch selected.

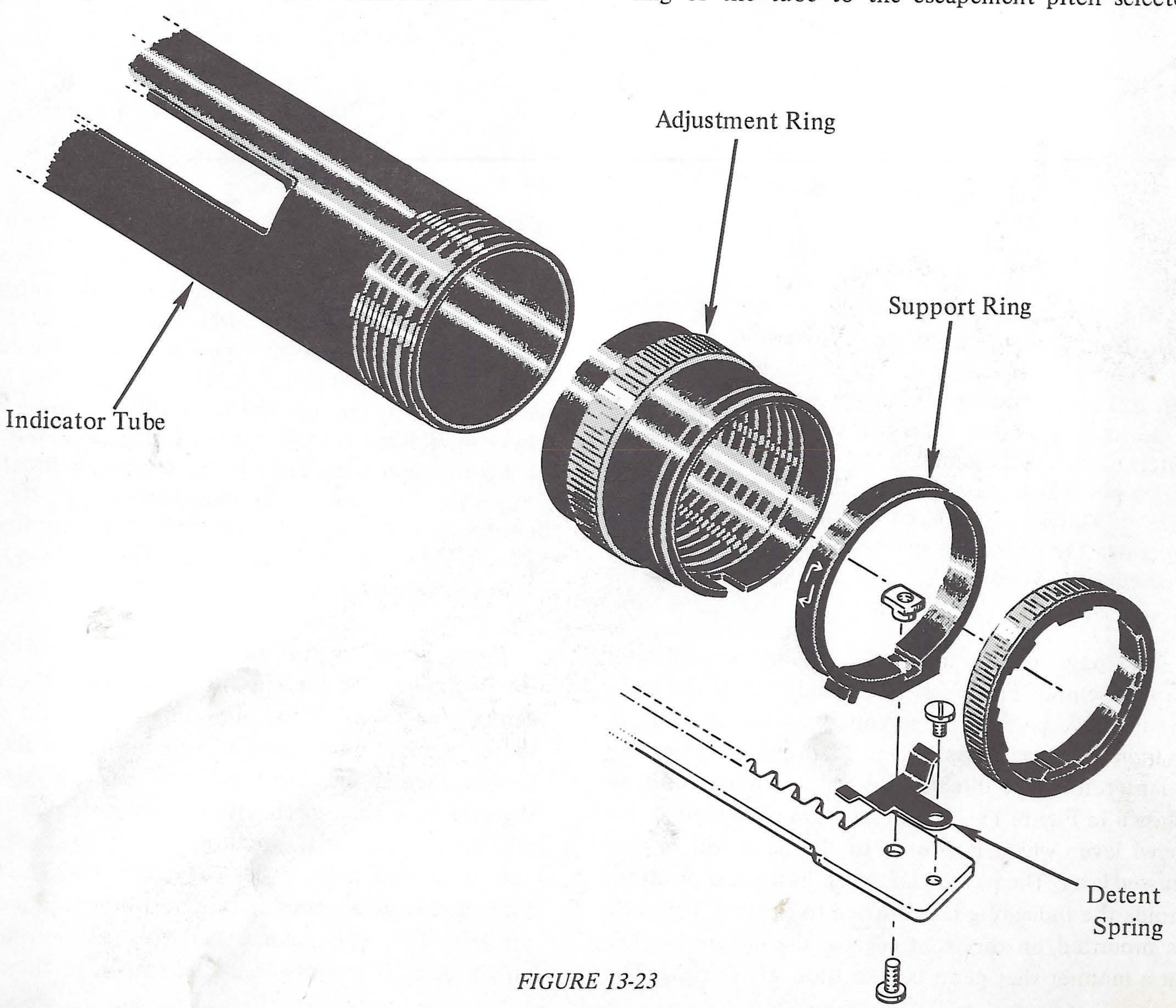


FIGURE 13-23

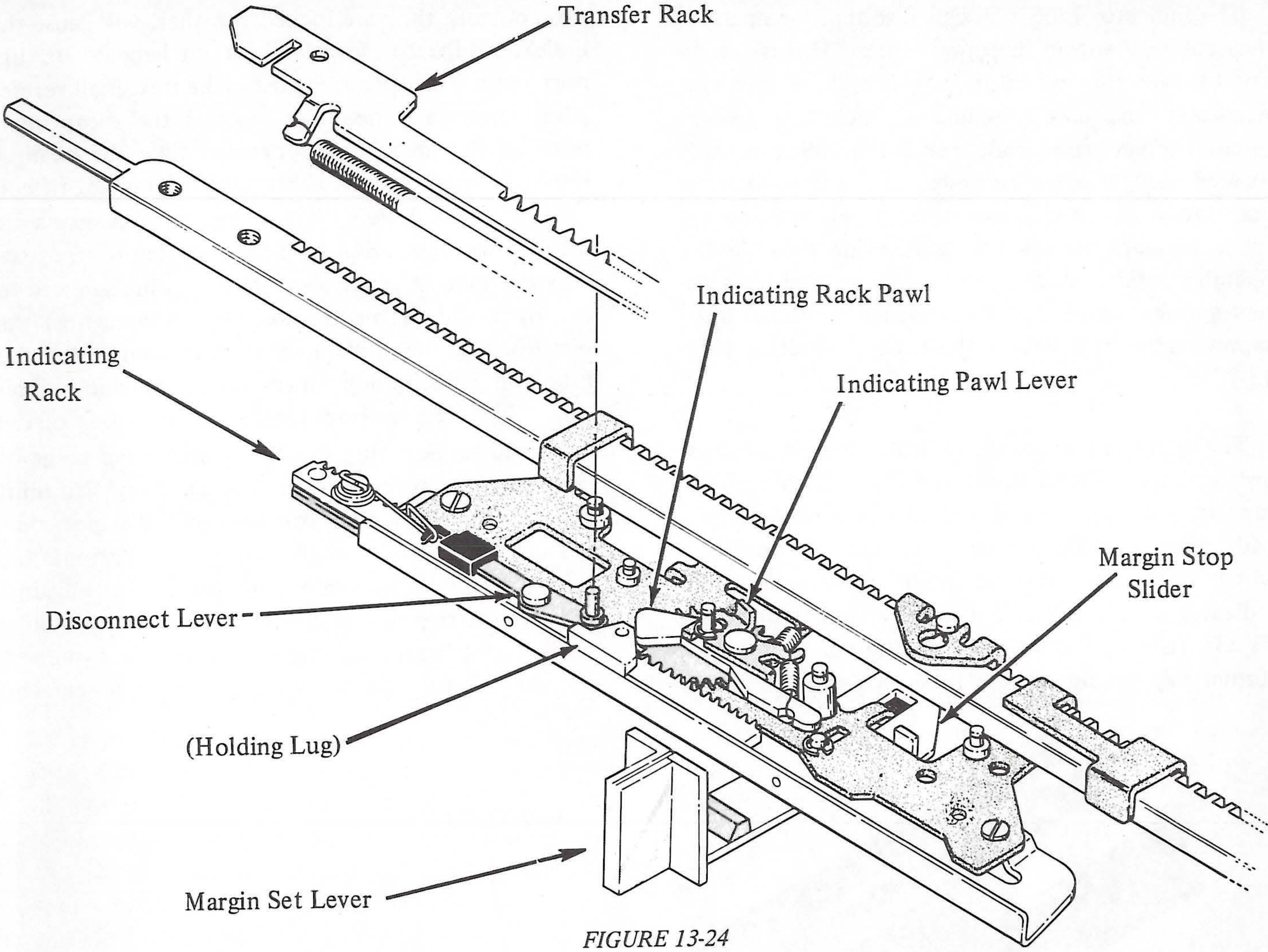


FIGURE 13-24

With the carrier resting anywhere to the left of the right hand margin, outside the justification zone, the indicator tube assembly is indirectly being held to the left against its spring tension by a pawl on the right hand margin bracket. This bracket mounts on the 12 pitch margin rack. A margin stop slider on the bracket has a pin which seats in the teeth located on the back side of this rack. A margin set lever mounts on and operates the slider in a manner similar to that of the "Selectric" Typewriter.

The pawl that is indirectly holding the indicator tube assembly in its rest position is called the indicating rack pawl. It is mounted on the right hand margin bracket by a stud and is spring loaded in the counterclockwise direction by an extension spring as shown in Figure 13-24. The function of the indicating pawl lever which is riveted to the pawl will be discussed later. The pawl itself, when in the rest position, holds the indicating rack latched to the left. This rack is mounted on the front edge of the margin bracket in a manner that permits it to slide left or right. The pawl operates against a holding lug on the top surface of the rack. This rack, which is being held to the left, is then linked to the transfer rack by means of the disconnect lever (Fig. 13-24). The disconnect lever is mounted to the top surface of the indicating rack by a shouldered rivet. A hairpin spring at the left end loads the disconnect lever in the clockwise direction. This causes the pin on the right hand end of the disconnect lever to set into one of the teeth located in the back side of the transfer rack. The entire system is now held latched in its rest position.

If the indicating rack pawl were disengaged from the holding lug on the indicating rack, then the indicating tube assembly and indicating rack would slide to the right in unison under the influence of the indicator tube spring. Teeth cut into the back edge of the indicating rack mesh with the indicator gear. This gear mounts below the indicating rack pawl on the same stud that mounts the pawl (Fig. 13-25). It, in turn, meshes with a combination gear mounted just to the left of it. This second gear is called the sensing pinion gear. It mounts on a stud riveted to the mar-

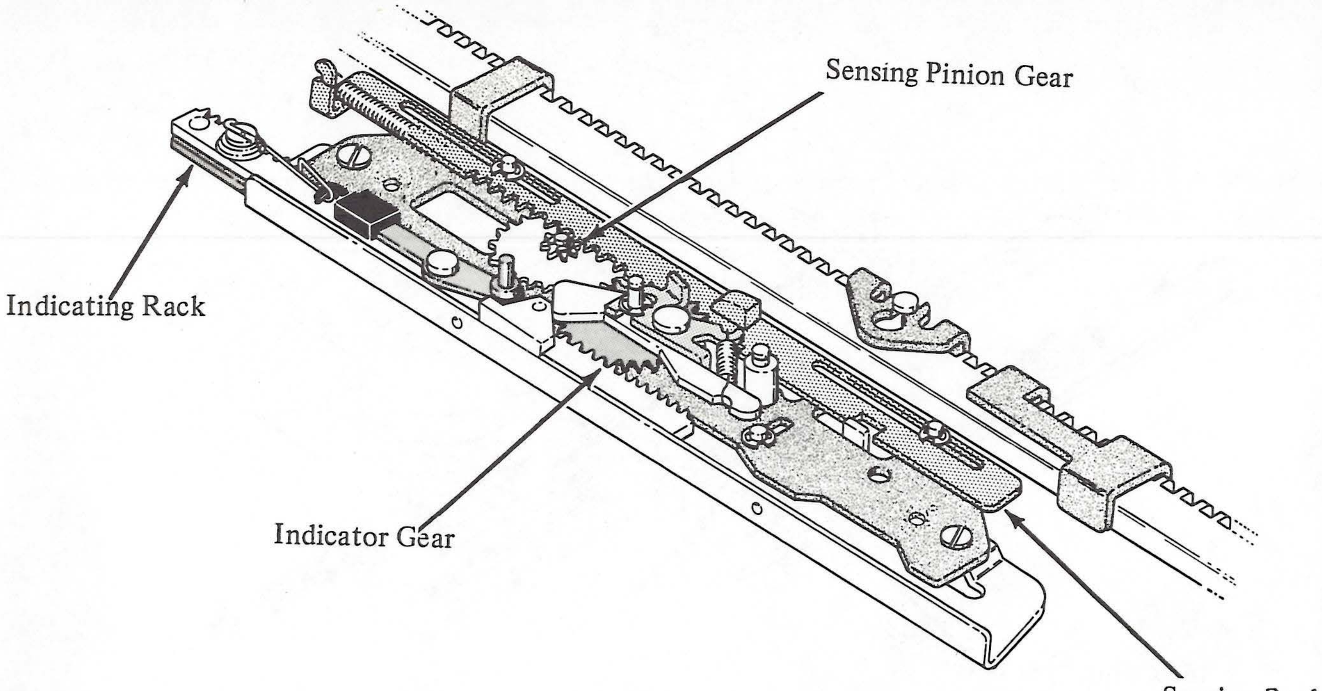


FIGURE 13-25

gin bracket. The small diameter gear of this combination gear meshes with teeth cut into the forward edge of the sensing rack (Fig. 13-25). This rack is also mounted on the right hand margin bracket in a manner so that it can slide left or right.

Now, if the indicating rack pawl were disengaged from the holding lug on the indicating rack, the spring load on the indicator tube assembly would begin to slide this rack toward the right. This would cause the indicator gear to rotate counterclockwise which would then drive the sensing pinion gear in the clockwise direction. The sensing rack, which is meshed with the smaller gear, would begin sliding toward the right but at a much slower speed. The sensing rack would only move 1/3 as far as the indicating rack because of the motion reduction that occurs in the sensing pinion gear. You can see now that this pinion gear will provide the amplification of motion between the carrier and the indicator tube. The indicator gear only functions as an idler or direction changer. The extension spring fastened to the left end of the sensing rack helps the system in spring loading the sensing rack towards the right.

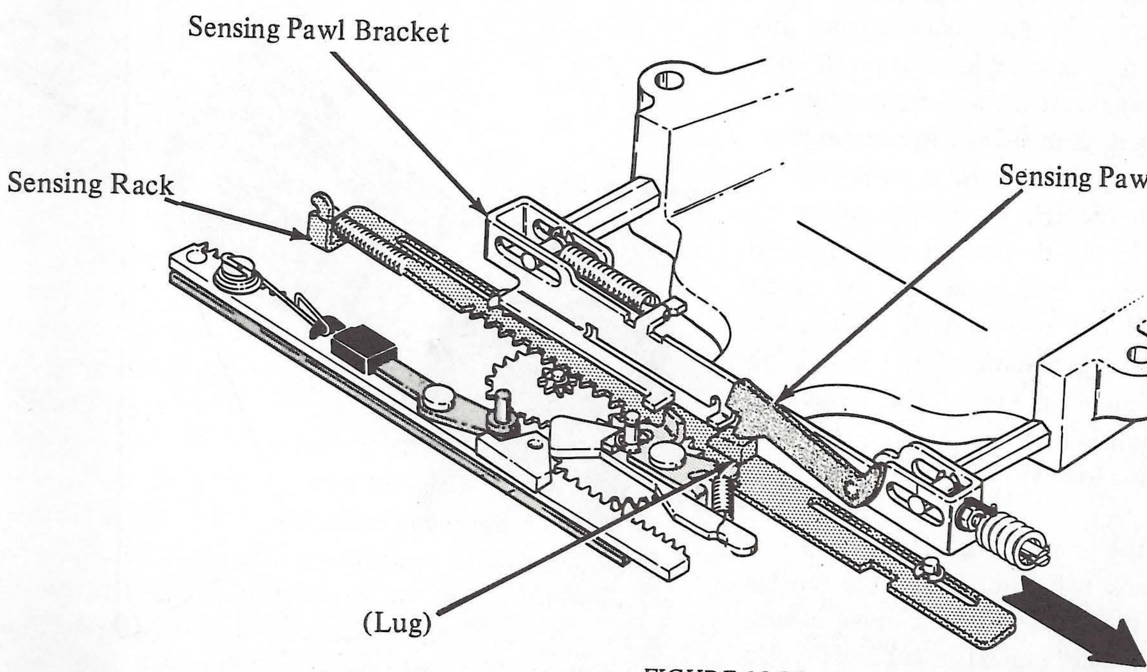


FIGURE 13-26

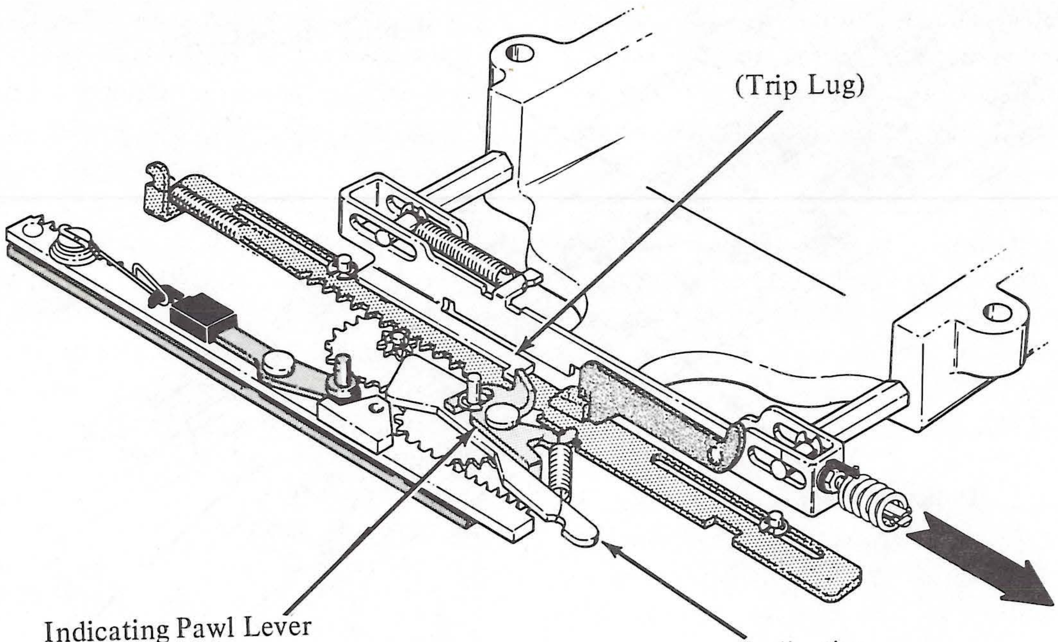


FIGURE 13-27

All movement of the sensing rack towards the right is directly controlled by the carrier. It is the carrier's movement into the justification zone that causes the indicating rack pawl to be disengaged from the holding lug on the indicating rack. As the carrier approaches the justification zone a sensing pawl, mounted on a pivot stud on the sensing pawl bracket attached to the front of the carrier, rides slightly above the top surface of the sensing rack (Fig. 13-26). This sensing pawl is spring loaded in the counterclockwise direction against a stop on the sensing bracket. Just as the carrier approaches the justification zone this sensing pawl is cammed over a lug located on the top surface of the sensing rack. As the sensing pawl drops back to rest on the right hand side of the sensing lug, a trip lug which is part of the sensing pawl bracket comes in contact with the trip ear of the indicating pawl lever (Fig. 13-27). As the carrier continues to escape the indicating pawl lever causes the indicating rack pawl to rotate clockwise about its pivot stud. This results in the disengagement of the indicating rack pawl from the holding lug of the indicating rack. The entire system is now free to slide towards the right under its spring load (Fig. 13-27).

Within four units the sensing lug on the top surface of the sensing rack will catch up to the sensing pawl on the carrier; the rack will then move in unison with the carrier. The indicator tube will also move in unison but with a three to one movement ratio. Wherever the carrier stops in the justification zone the indicator tube will stop and reflect the carrier's position with respect to the right hand margin. The carrier's position indicated will always be in the form of justification data; a color and a number.

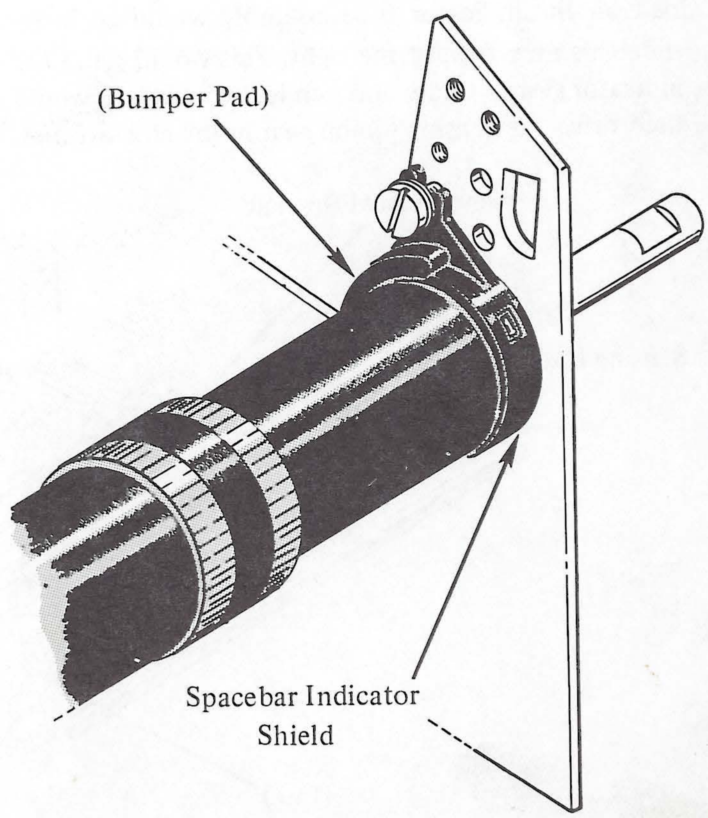


FIGURE 13-28

As long as the carrier does not move beyond the right hand margin, the indicator tube will read the carrier's position. Once the carrier has gone beyond the margin, the sensing rack will no longer follow the carrier. This is because the indicator tube has run out of motion. Its motion to the right is limited by a bumper pad on the spacebar indicator shield. This shield, which is mounted to the inside of the right hand justification plate, encircles the right hand end of the justification tube (Fig. 13-28). Its purpose will be explained later.

5. Indicator Tube Restoring Operation

After the operator has read the data from the justification window, she applies it to the variable spacebar and then tabs the carrier over to the left hand margin of the right galley. While she is typing out this line, the indicator tube, which has run out of motion, is resting against its bumper located on the spacebar indicator shield. Once the operator finishes typing out the justified line, she returns the carrier to the left hand margin. The return motion of the carrier restores the indicator tube assembly back to its rest position so that it will be ready to read the carrier's position when the next line is typed. The following is the explanation of this restoring operation.

As the carrier is traveling towards the left hand margin the sensing pawl is driven into the sensing lug on the sensing rack as shown in Figure 13-29. Continued movement of the carrier towards the left hand margin drives the sensing rack towards the left. This in turn, through the sensing pinion and indicator gears, powers the indicating rack towards the left. As the holding lug on the top surface of the indicating rack comes in contact with the indicating rack pawl, it cams the pawl out of the way (Fig. 13-29). Once the holding lug has passed the pawl, the pawl restores back to its latching position. At the same time that the indicating rack pawl is being cammed out of the way, the trip lug on the sensing pawl bracket comes in contact with the trip ear on the indicating pawl lever. The mounting of this lever allows it to be cammed forward out of the way as the carrier passes by (Fig. 13-31). Just as the indicating rack pawl resets on the right hand side of the holding lug on the indicating rack, the driving action being produced on the sensing rack by the carrier is disengaged. This disengaging action is accomplished by the sensing rack release lever (Fig. 13-29). When the vertical lug of the sensing pawl comes in contact with this lever, the sensing pawl rotates clockwise disengaging itself from the sensing lug on the rack. The driving action stops and the entire system settles back to its rest position against the indicating rack pawl.

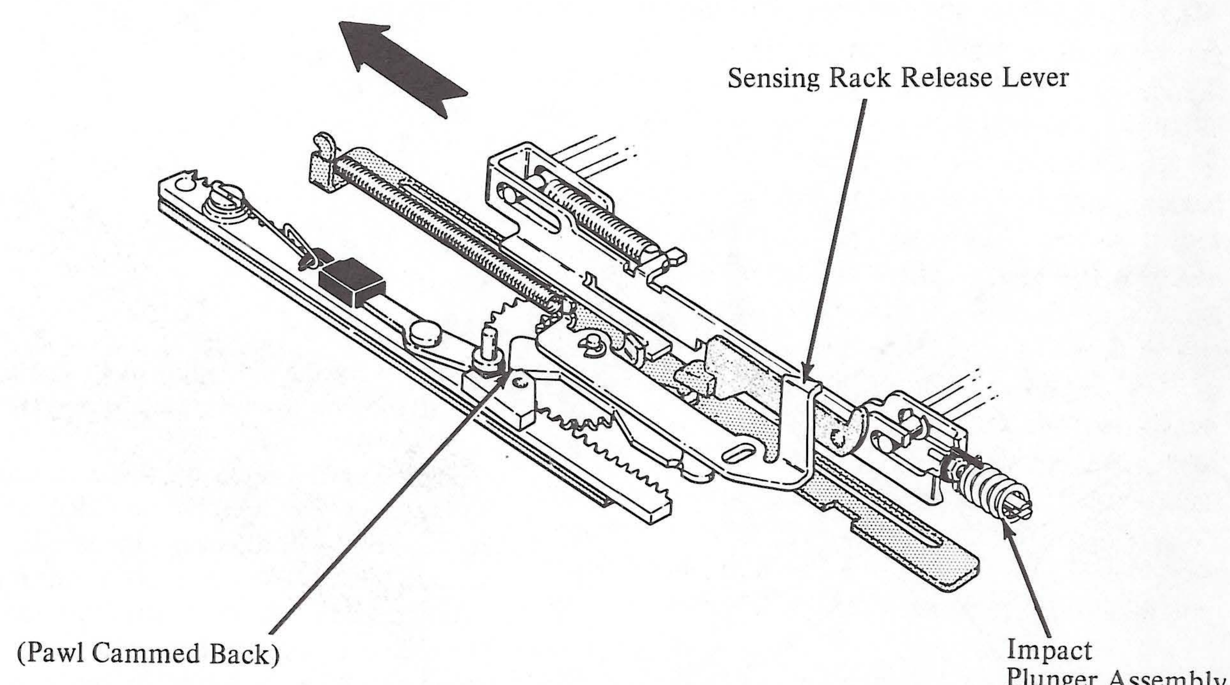


FIGURE 13-29

The sensing rack release lever is mounted on the margin bracket by two studs. The pivot stud at the left is the same stud that mounts the indicating rack pawl and indicator gear. The stud on the right fits in an elongated hole in the lever and serves mainly as a guide for the lever. It permits the right hand end of the lever to be cammed out of the way by the sensing pawl each time the carrier passes by in the escapement direction. Once the sensing pawl has passed, the lever is spring loaded back to its rest position by an extension spring anchored to a lug on the left end. This is the same spring that loads the sensing rack towards the right. The sensing rack release lever, upon returning to its rest position after the carrier has passed, is now in position to disengage the sensing pawl from the sensing rack when the carrier is returned.

During a carrier return operation, quite a bit of impact occurs as the sensing pawl picks up the lug on the sensing rack. To absorb most of this impact, the entire sensing pawl bracket assembly on the carrier has been mounted in a manner so that a cushioning effect will occur between the carrier and the sensing rack. The sensing pawl bracket is mounted to two studs on the carrier. The mounting holes in the bracket are elongated and a heavy extension spring between the bracket and the left hand stud loads the bracket to the left (Fig. 13-29). During a return operation, when the sensing pawl strikes the lug on the sensing rack, the heavy spring stretches. Most of the impace on the sensing pawl and sensing rack, as the sensing pawl picks up the sensing rack and the tube, is absorbed by the extending of the spring. This reduces the stresses on the tube pickup operation.

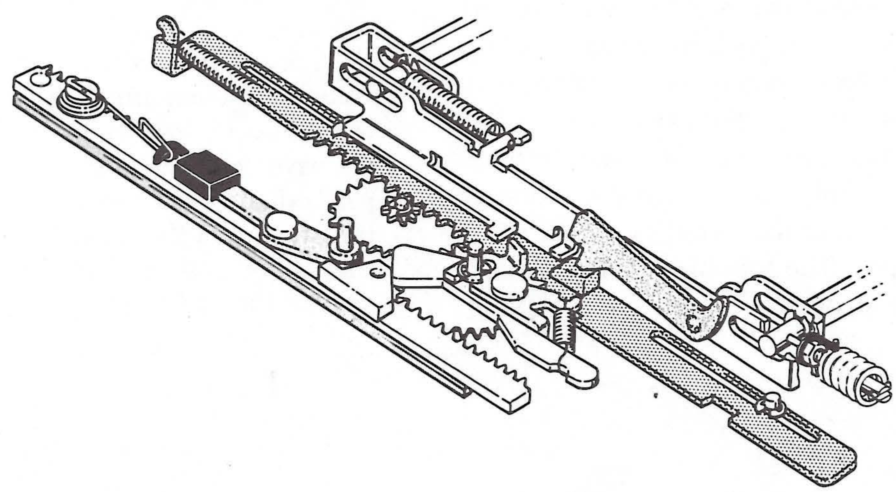


FIGURE 13-30

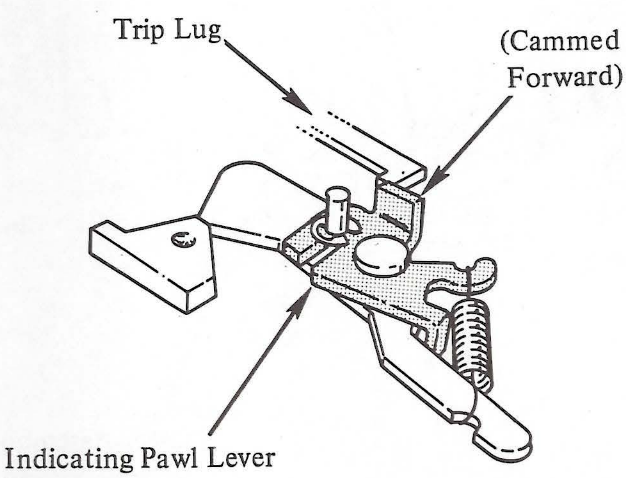


FIGURE 13-31

As the carrier picks up the tube and the extension spring on the bracket is extended, the sensing rack release lever will disengage the sensing pawl from the sensing rack. Since the heavy spring on the bracket is extended and the load from the tube is no longer there, the bracket restores with great velocity. This could result in breakage to the right hand sensing pawl bracket mounting stud. Therefore, an impact plunger assembly is incorporated to prevent damage

(Fig. 13-29). The plunger assembly serves another purpose which is to adjust the lateral position of the sensing bracket.

The impact plunger assembly consists of a plunger which is spring loaded to the left against the sensing bracket mounting stud (Fig. 13-29). A bushing with threads on its outside periphery is used to provide lateral adjustment to the bracket. The plunger is inserted through the center of the bushing, and is spring loaded to the left by a heavy compression spring. The compression spring screws on a shoulder on the bushing at one end and has a loop turned in the center on the other end, which fits through a slot on the impact plunger. An anchor on the bushing between a locking nut and the bracket keeps both the bushing and the compression spring in their adjusted position. It is the bushing threaded into the sensing bracket that provides the lateral adjustment of the bracket.

After the sensing rack release lever disengages the sensing pawl and the sensing bracket restores to the left, the impact plunger contacts the right hand sensing mounting stud, and extends the compression spring (Fig. 13-30). It is the compression spring that provides the energy absorbing characteristics that prevent parts damage when the sensing bracket is restored.

The sensing bracket will return to its rest position because the compression spring is stronger than the extension spring.

During the restoring operation of the indicator tube assembly, the indicator tube travels at three times the speed of the carrier. This is due to the three to one ratio gain in the sensing pinion gear. In order to permit this tube assembly to travel at this speed and still be able to stop abruptly without damaging

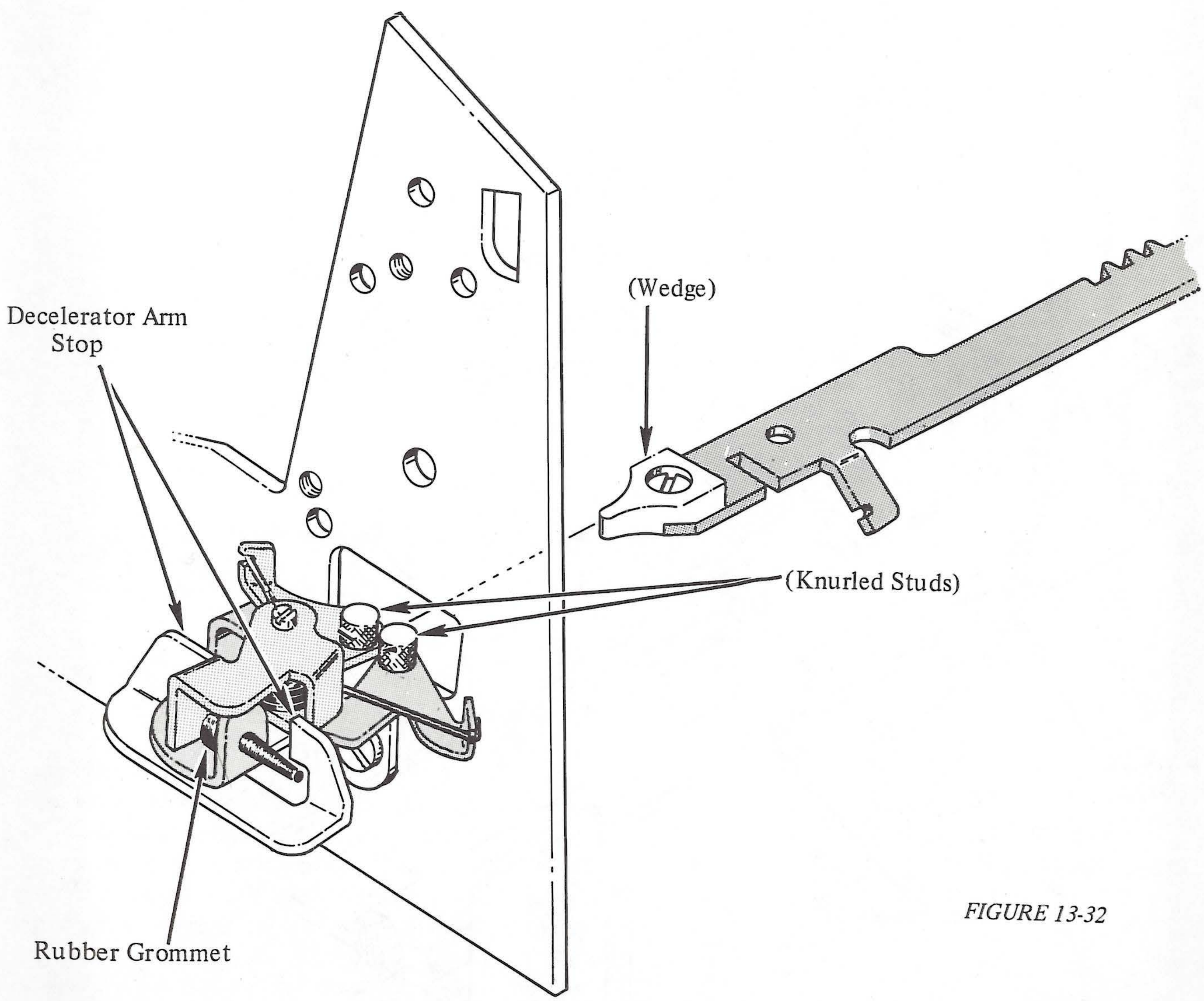


FIGURE 13-32

its components, a decelerator mechanism had to be incorporated. A wedge fastened to the left end of the transfer rack is driven between two knurled studs as the tube assembly approaches its rest position. These two studs are spring loaded toward each other (Fig. 13-32). The principle is similar to that of the spring loaded sensing bracket: The majority of the momentum developed in the moving assembly is dissipated as the wedge drives the two rollers apart.

This decelerator assembly is mounted outside the left hand justification plate on the lock lever bracket (Fig. 13-32). A shouldered screw mounts both decelerator arms and the decelerator arm stop. A hairpin spring loads the two studs toward each other. When the two decelerator arms are at rest, the rest position of each arm is controlled by a vertical tab on the decelerator arm stop. The active position of the arms is limited by the rubber grommet which mounts between the two vertical tabs at the left end of the arms.

6. Margin Reset Operation (Right Hand)

The operator resets her right hand margin on this machine in the same manner as she does on the "Selectric" Typewriter. The only difference is that on the "Selectric" Composer the carrier must be positioned to the left of the justification zone before it is possible to reset the right hand margin. This is to assure that the indicator tube assembly and all of its related components mounted on the right hand margin bracket will be in their rest or latched position. The margin reset mechanism is designed such that unless the indicator tube assembly is in its rest position, the margin set lever will be interlocked preventing the operator from moving it.

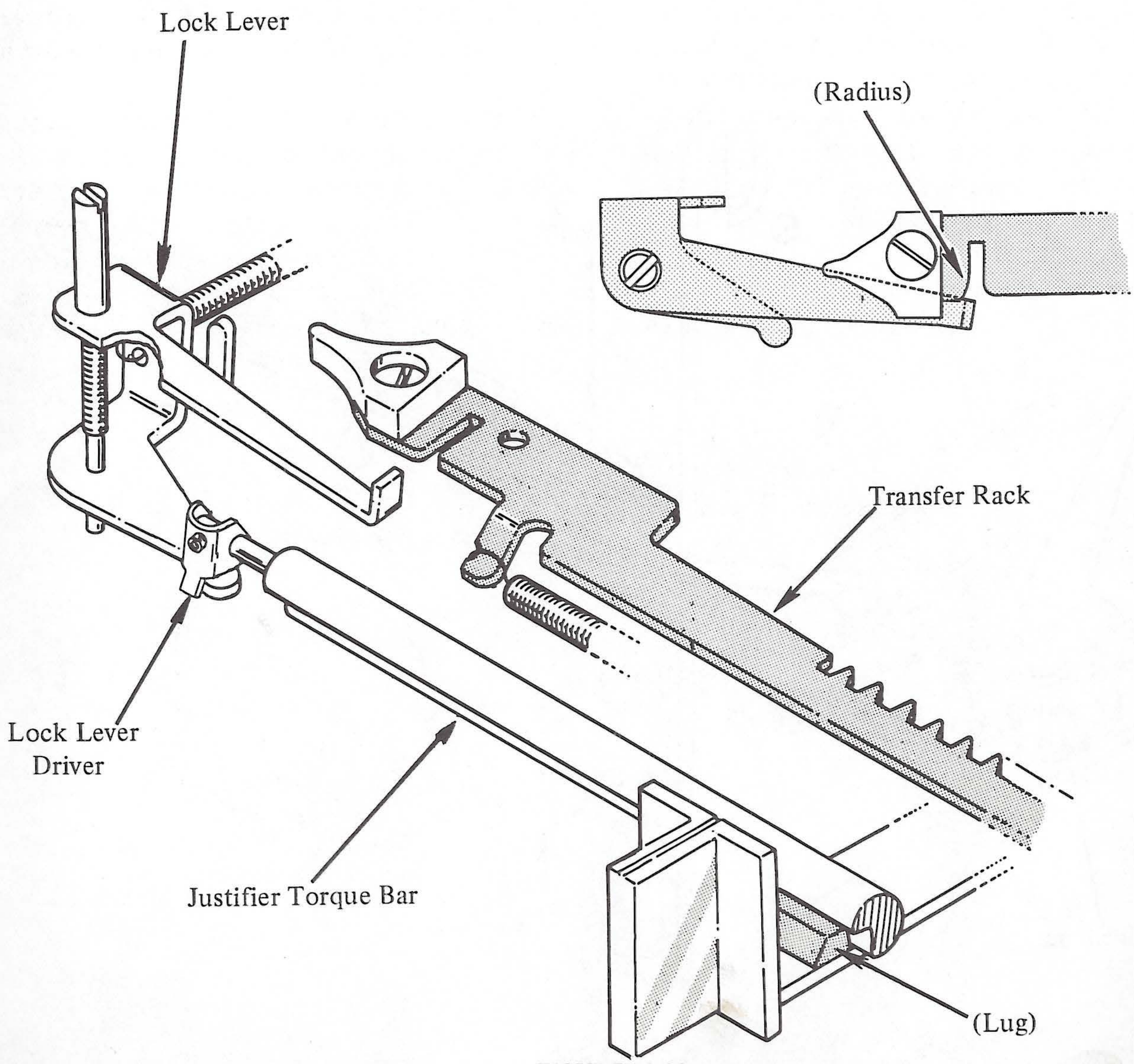


FIGURE 13-33

Whenever the operator pushes the margin set lever to the rear, three operations occur in the following order:

a. The indicator tube assembly is locked into its rest position.

b. The right hand margin bracket assembly is isolated from the indicator tube assembly.

c. The pin on the margin stop slider is disengaged from the teeth on the margin rack, permitting the entire margin bracket assembly to be moved left or right along the margin rack.

Releasing the margin set lever permits these three operations stated above to occur in the reverse order.

Let's now follow operation "a" to see how the indicator tube assembly is locked in its rest position. As the margin set lever is pushed toward the rear a rectangular lug on the top surface of the lever engages a lip on the justifier torque bar. This bar which runs the length of the writing line mounts and pivots between the justification plates as shown in Figure 13-33. As the margin set lever is pushed toward the rear, it causes this torque bar to rotate top towards the front.

Set screwed to the left end of the justifier torque bar on the outside of the left hand justification plate is the lock lever driver. Rotation of the torque bar causes this driver to push on the lower arm of the lock lever (Fig. 13-33). This causes the lock lever, which is mounted on the same pivot stud as the decelerator arms, to rotate counterclockwise. This action causes the vertical tab on the right end of the upper arm to swing into engagement with a slot in the left end of the transfer rack, thus locking the indicator tube assembly in its rest position. The operating side of the slot in the transfer rack is cut at a slight angle with respect to the sweep angle of the lock lever. This causes the transfer rack to be cammed very slightly toward the left as the lock lever enters the slot (Fig. 13-33). The purpose of this action is to relieve the spring load that the indicator tube is applying on the right hand margin bracket assembly. The load being applied by the indicator tube spring is now placed on the lock lever.

If and when the operator decides to release the margin set lever, an extension spring fastened to the lower arm of the lock lever supplies the force required to disengage the lock lever from the transfer rack.

Now that we have the indicator tube assembly locked in its rest position and the spring load removed from the margin bracket assembly, we can proceed to step "b". This second operation is the process of disconnecting or isolating the margin bracket assembly from the indicator tube assembly. This is accomplished through the disconnect lever. As the margin

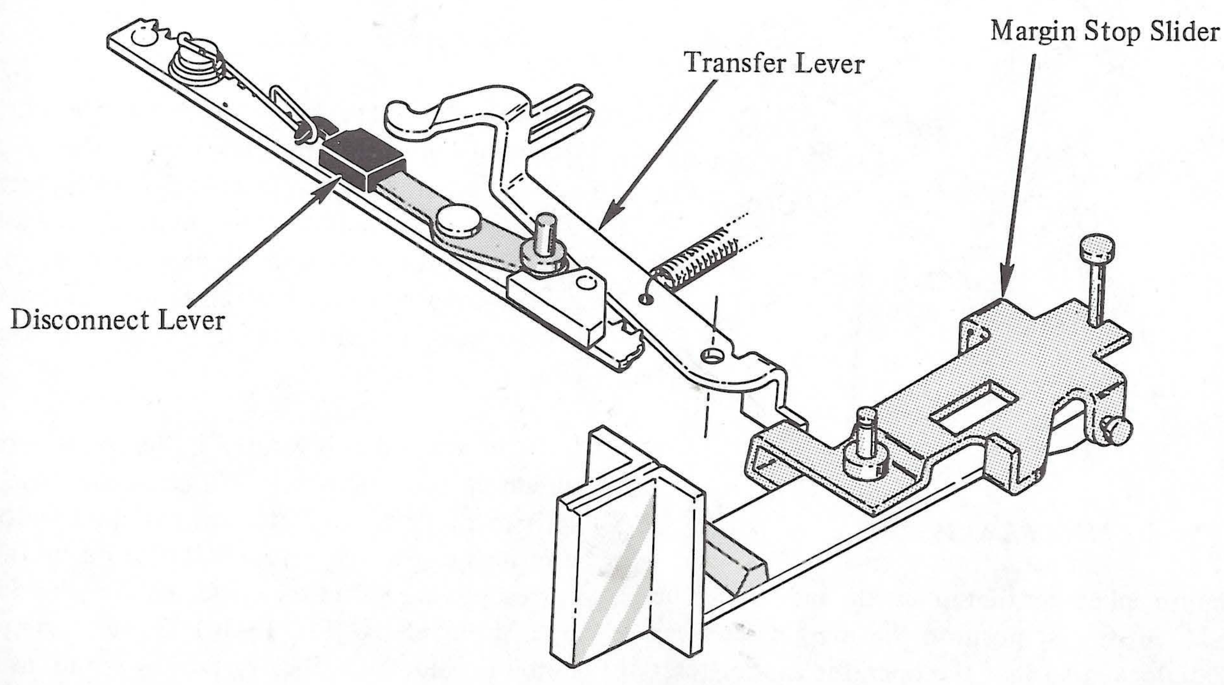


FIGURE 13-34

set lever is pushed toward the rear, it causes the margin stop slider to move towards the rear. A lug extending down on the left front corner of the slider contacts the right end of the transfer lever (Fig. 13-34). This causes the transfer lever to pivot counterclockwise about its mounting stud. The left end of the transfer lever which projects up through a rectangular hole in the margin bracket contacts the left end of the disconnect lever causing it to pivot in the counterclockwise direction. This results in the disengagement of the right hand end of the disconnect lever from the teeth in the transfer rack. The margin bracket assembly is now disconnected from the indicator tube assembly.

Full movement of the margin set lever towards the rear causes the pin on the margin stop slider to become disengaged from the teeth on the rear edge of the margin rack. The operator may now slide the entire margin bracket assembly to any desired location on the margin rack to within 12 picas of the left hand margin. When she releases the margin set lever the slider pin will come back into engagement with the teeth on the margin rack, the disconnect lever will now enter a corresponding tooth on the transfer rack, and then the lock lever will be disengaged from the transfer rack allowing the loading of the indicator tube assembly to be placed back on the margin bracket assembly. Resetting of the right hand margin has been accomplished.

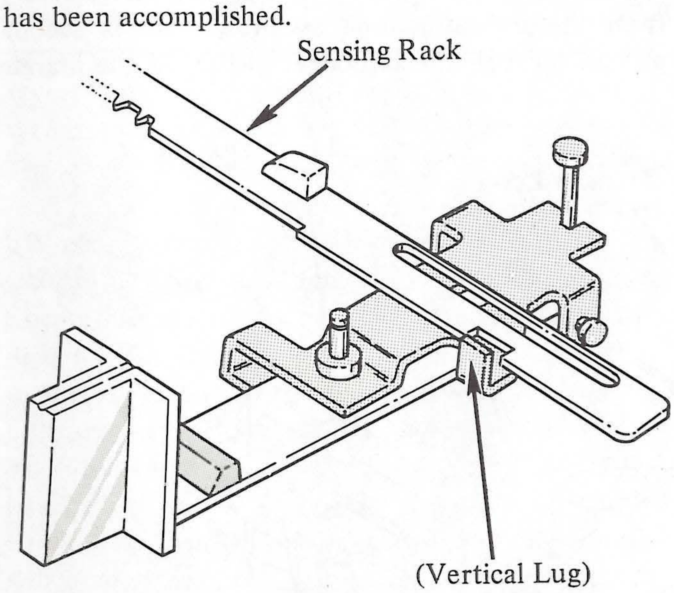


FIGURE 13-35

We mentioned earlier that unless the indicator tube assembly is in its rest position the margin set lever will be interlocked so that the operator cannot reset the right hand margin. This is achieved through a vertical lug on the margin stop slider. In order for the slider to move towards the rear when the operator pushes the set lever in, a recessed portion in the forward edge of the sensing rack must be aligned with the vertical lug on the slider (Fig. 13-35). The alignment of this recess in the sensing rack provides the interlocking action. It is only in line with the lug on the slider when the indicating rack is latched in its rest position. Any other time the slider cannot be operated to the rear, thus the margin set lever is interlocked.

"WRITE" MODE OPERATION

Now that you have an understanding of the "read" mode operation of the justifier mechanism, let's go into the "write" mode operation. This is where the operator takes the justification data which she has read from the indicator window, and applies it to the variable spacebar mechanism. This data consists of a color and a number. The color represents the setting of the spacebar value dial while the number represents the setting of the spacebar quantity dial.

Let's begin with the setting of the spacebar value dial. When the operator rotates this value dial counterclockwise out of its black or three unit setting she is causing two operations to take place. Not only is she entering the desired spacebar value, but she is also changing the mode of the mechanism from "read" to "write".

1. Spacebar Value Selection

The spacebar value dial provides the operator with a means of controlling the escapement value of a spacebar operation. With this dial she may select any spacebar value ranging from three units to nine units. As she rotates the dial to the desired selection, a pinion gear set screwed to the bottom of the dial shaft causes a value rack to shift laterally on its mounting shaft (Fig. 13-36).

If the value dial is rotated in the counterclockwise direction, the pinion gear will cause the value rack to shift to the left. A selector key fitted into a long keyway in the spacebar value shaft projects up through a corresponding slot in the value rack. It is held in place by a spring clamp (Fig. 13-36). This arrangement permits the value rack to carry the key with it as it slides left or right while still keeping it locked rotationally to the spacebar value shaft.

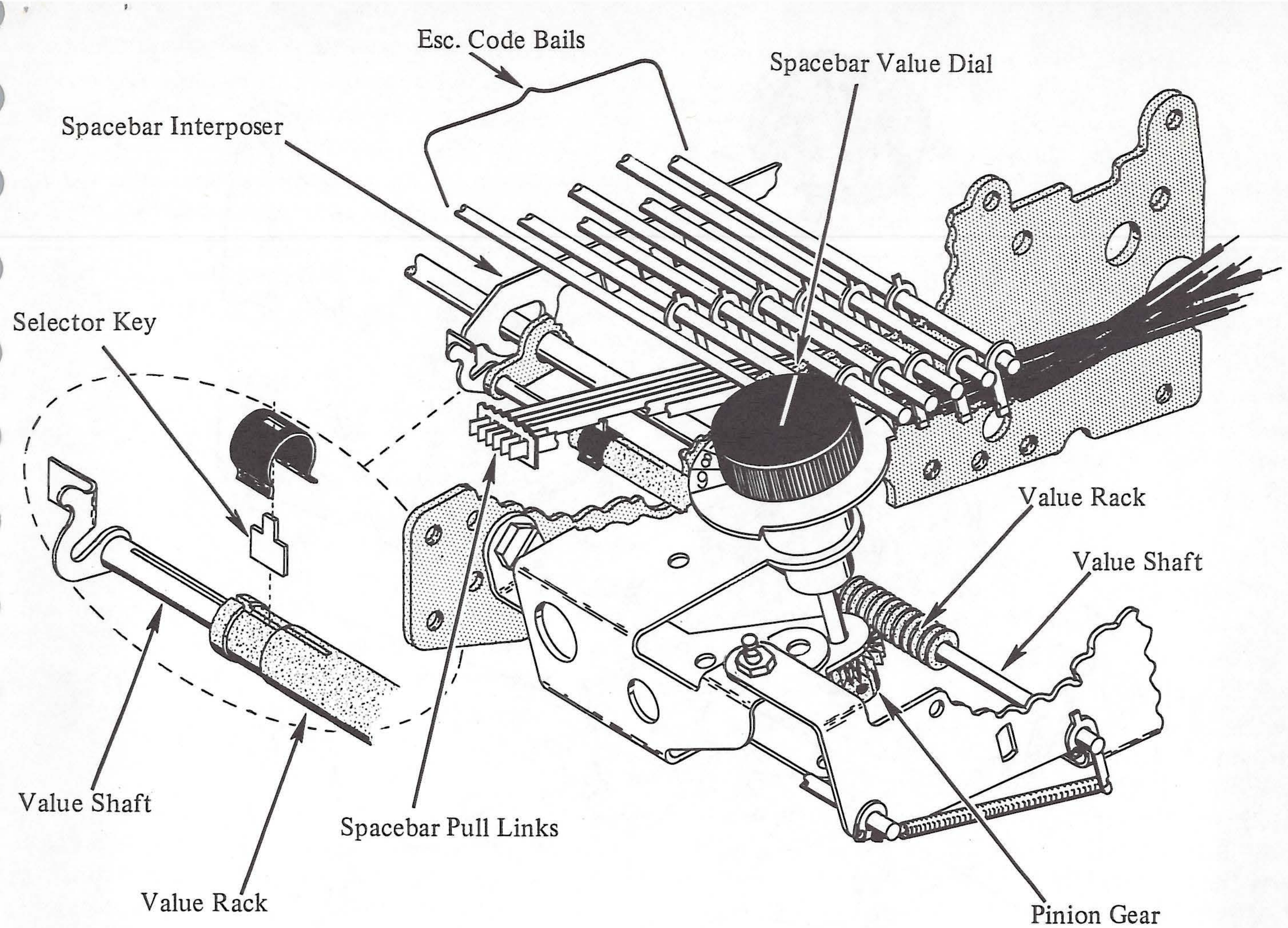


FIGURE 13-36

This selector key extends up and operates in the notched areas of a group of six pull links as illustrated in Figure 13-36. Effectively, when the operator rotates the value dial she is aligning this selector key behind one of these spacebar pull links. This sets up the unit value selection for a spacebar operation. Assume that the operator has rotated the value dial from a black (3 unit) to an orange (5 unit) setting. This would cause the value rack to slide to the left positioning the selector key directly in line with the five unit pull link.

Now, when the operator initiates a spacebar operation the filter shaft drives the spacebar interposer forward. This forward movement of the interposer pushes on the vertical arm riveted to the left end of the spacebar value shaft causing the shaft to rotate top towards the front. As the selector key rotates it picks up and drives the five unit pull link forward. The rear of the pull link is connected to a bellcrank attached to the five unit escapement code bail. This forward movement of the five unit pull link causes the five unit escapement code bail to rotate, thus five units of escapement are obtained. The escapement action from the code bail on through the rest of the escapement mechanism occurs in exactly the same manner as it does in a normal five unit character selection.

When the operator rotates the spacebar value dial to any of the seven different selections, the dial detents in that selection. This detenting action assures that the selector key will stay properly aligned with its respective pull link. This action is also helpful to the operator in setting the dial as the detent action pulls the dial into position as the operator rotates the dial to the desired setting. This action is achieved through a detent that is spring loaded against the teeth of a ratchet which is set screwed on the dial shaft. This ratchet is located just above the value pinion on the underside of the justification bracket (Fig. 13-37).

This ratchet, called the spacebar value ratchet, has another purpose besides providing a detenting action to the value dial. Its purpose will be explained later in this "write" operation. The detent that operates

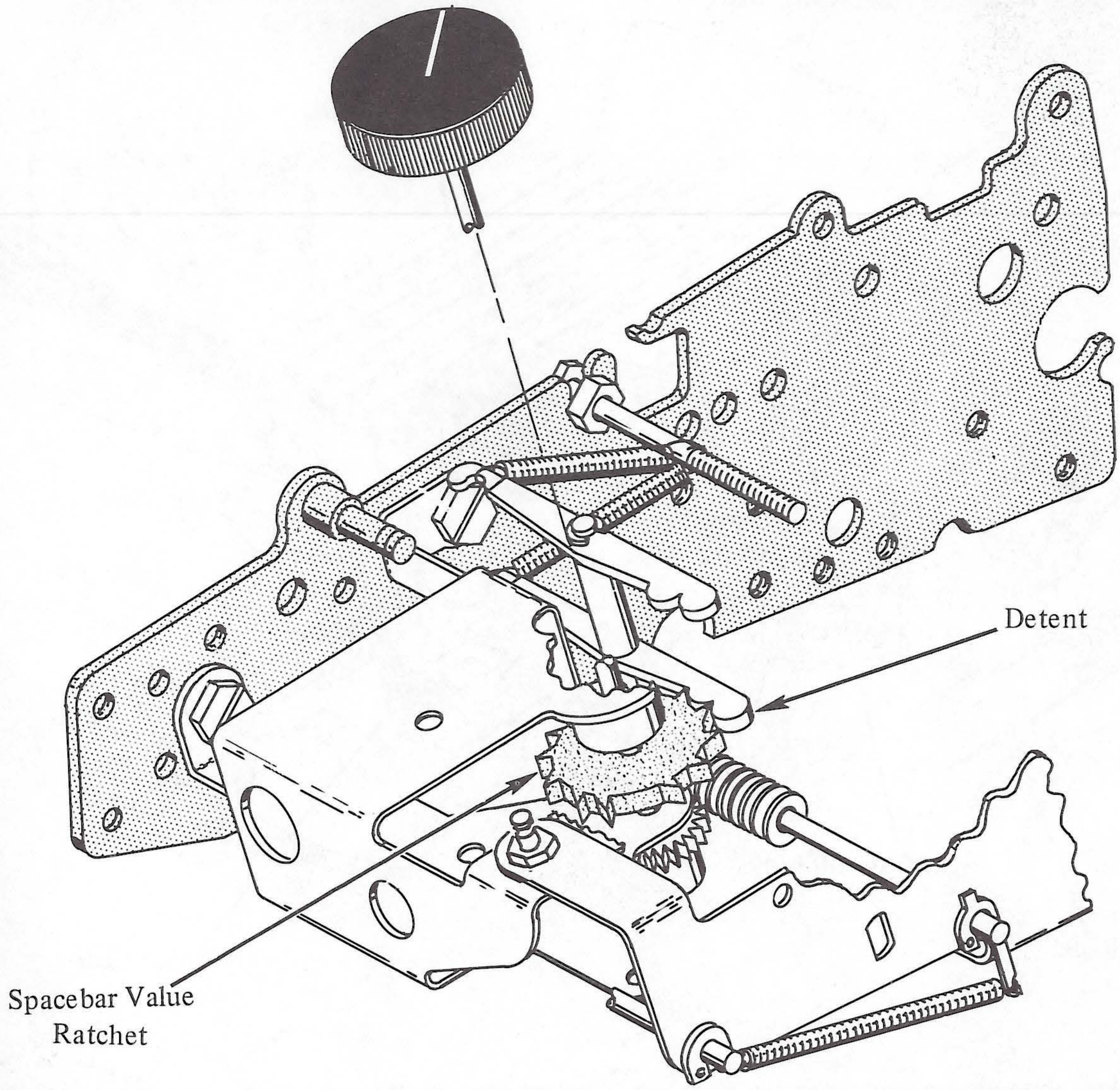


FIGURE 13-37

against the ratchet teeth mounts on a pivot stud fastened to the justification bracket (Fig. 13-37). An extension spring loads the detent clockwise against the ratchet.

All other areas of the spacebar mechanism not pertinent to the spacebar value selection has been explained earlier in Section 10 - Spacebar Mechanism. In this area we have only been concerned with the application of the justification data to the variable spacebar mechanism.

2. "Write" Mode Selection

Recall from earlier, whenever the justification lever is pulled into its "read" position a vertical lug on the lever drives the spacebar value dial to its 3 unit setting. Recall also: as the justification lever is pulled into its "read" or clockwise position, it becomes detented in this position by a small leaf type spring which operates against a nub on the justification lever cam (Fig. 13-38). Both the lever and cam operate as one piece and are spring loaded in the counterclockwise direction towards their "write" position. This spring loading comes from an extension spring fastened to a stud on the cam.

The only thing that holds the justification lever and cam in the "read" position is the detent spring. Any rotation of the spacebar value dial in the counterclockwise direction will drive the justification lever out of its detented position. This action is achieved through the same vertical lug on the justification lever that drives the value dial into its three unit setting whenever the lever is pulled into its "read" position. Once the counterclockwise rotation of the value dial has driven the justification lever far enough to be released from the holding action of the detent spring,

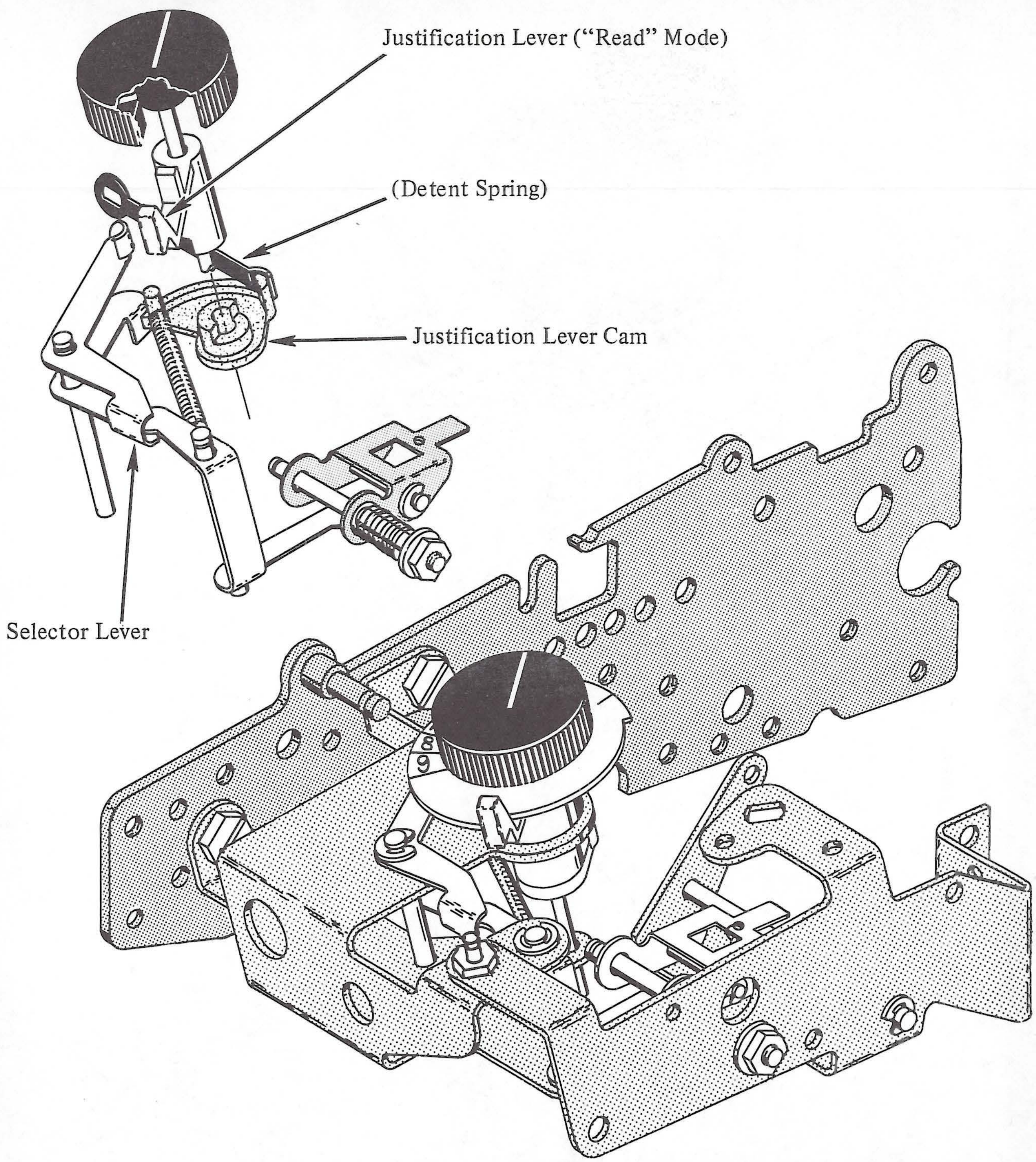


FIGURE 13-38

the lever and cam will swing all the way to the "write" position. The extension spring fastened to the cam produces this action (Fig. 13-38).

When the justification lever swings to its "write" position the camming surface on the justification lever permits the selector lever to pivot clockwise about its mounting pin. It pivots until the upper arm of the selector lever comes in contact with the center hub of the spacebar quantity dial (Fig. 13-39). Since the selector lever directly controls the position of the slider bellcrank and slider assembly, this action of the selector lever permits the slider assembly to shift to the left on its mounting stud. This shifting motion is produced by the compression spring on the mounting stud.

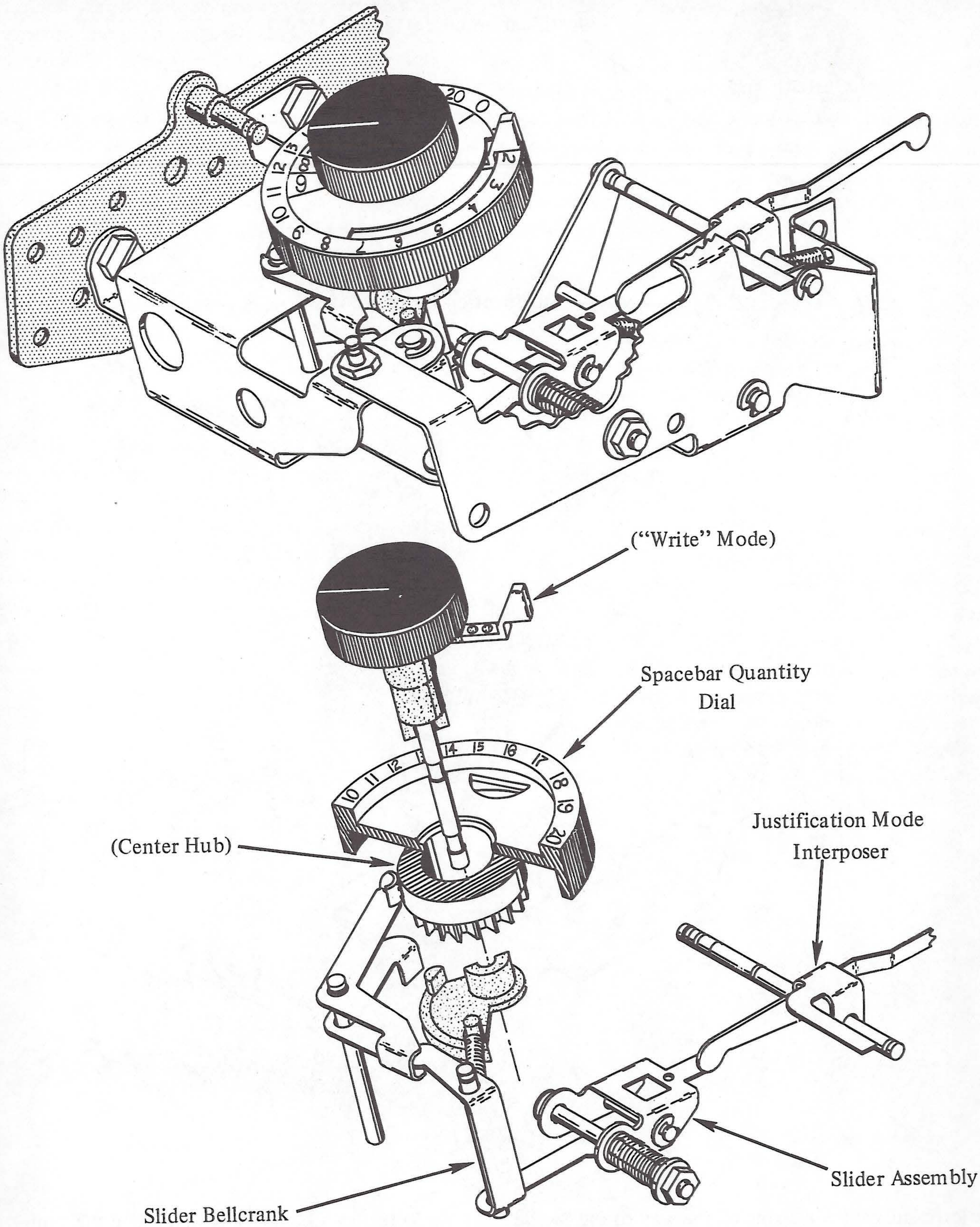


FIGURE 13-39

With the slider assembly shifted to this "write" position, the tab on the rear of the slider is no longer located under the forward extension of the justification mode interposer (Fig. 13-39). Therefore, if a spacebar operation should be initiated while the slider assembly is in this position, no lifting action will be produced to this interposer. Without this lifting action, motion cannot be supplied to the justification tube indexing mechanism.

3. Quantity Dial Step-Down Operation

The second part of the justification data to be applied to the variable spacebar mechanism is a number. This number represents the setting for the spacebar quantity dial. As pointed out in the explanation of operating principles, the operator merely rotates the quantity dial to the indicated number before typing the justified copy. During this typing the quantity dial automatically steps down one increment at a time for each spacebar used. When the dial steps from the one to the zero position, it sets up the necessary mechanical operation to step the spacebar value dial down to the next lowest setting. In this section we will only explain the step-down operation of this quantity dial.

The stepping action of this dial occurs only if the justification lever is in the "write" mode position and the quantity dial is set on any position other than zero. As we learned in the previous section, placing the justification lever in the "write" mode causes the slider assembly to shift to the left on its mounting stud. It is this new position of the slider that is responsible for producing the stepping operation for the quantity dial. In other words, shifting the slider to the right conditions the mechanism for a tube indexing operation; shifting the slider to the left conditions the mechanism for a quantity dial step-down operation.

With the slider positioned to the left the rear tab of the slider is located directly under the forward extension of the step-down interposer. This interposer is mounted on the same pivot shaft that mounts the justification mode interposer (Fig. 13-40). The pivot holes in the interposer are elongated so that it can slide back and forth. An extension spring fastened to the lower leg loads the interposer towards the rear on its mounting stud. The same spring also loads the interposer in the top to the front direction. A latch called the stepping latch controls the rest position of this step-down interposer. This latch mounts on a shaft in the forward portion of the step-down mounting bracket below the interposer (Fig. 13-40).

When the step-down interposer is in its rest position as shown in Figure 13-41A, the rear portion of the interposer rests just above and in front of the driving edge of the justification cam follower. During a "read" operation, where stepping of the quantity dial is not desired, the step-down interposer remains in its rest position. When the cam follower assembly

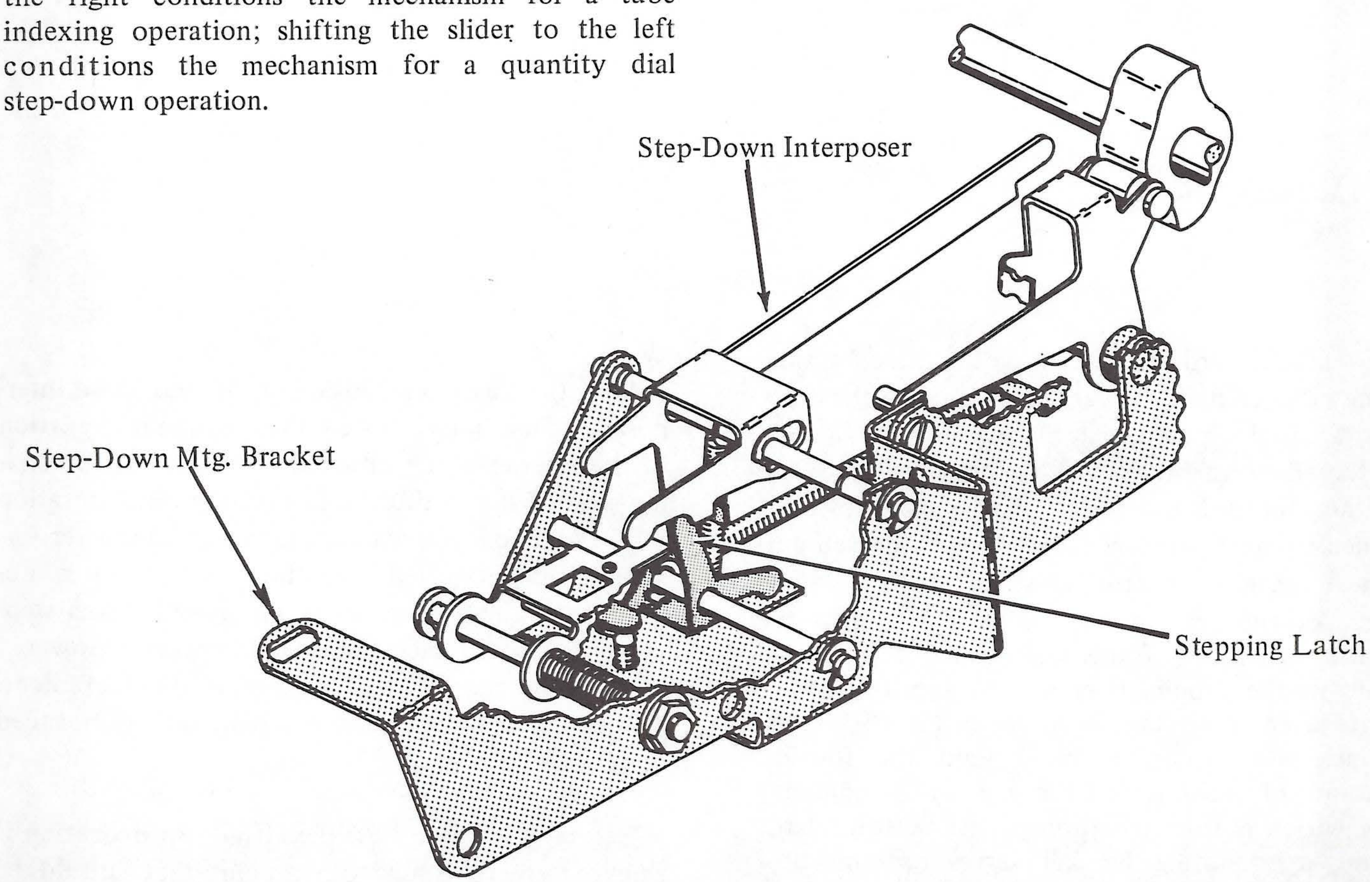


FIGURE 13-40

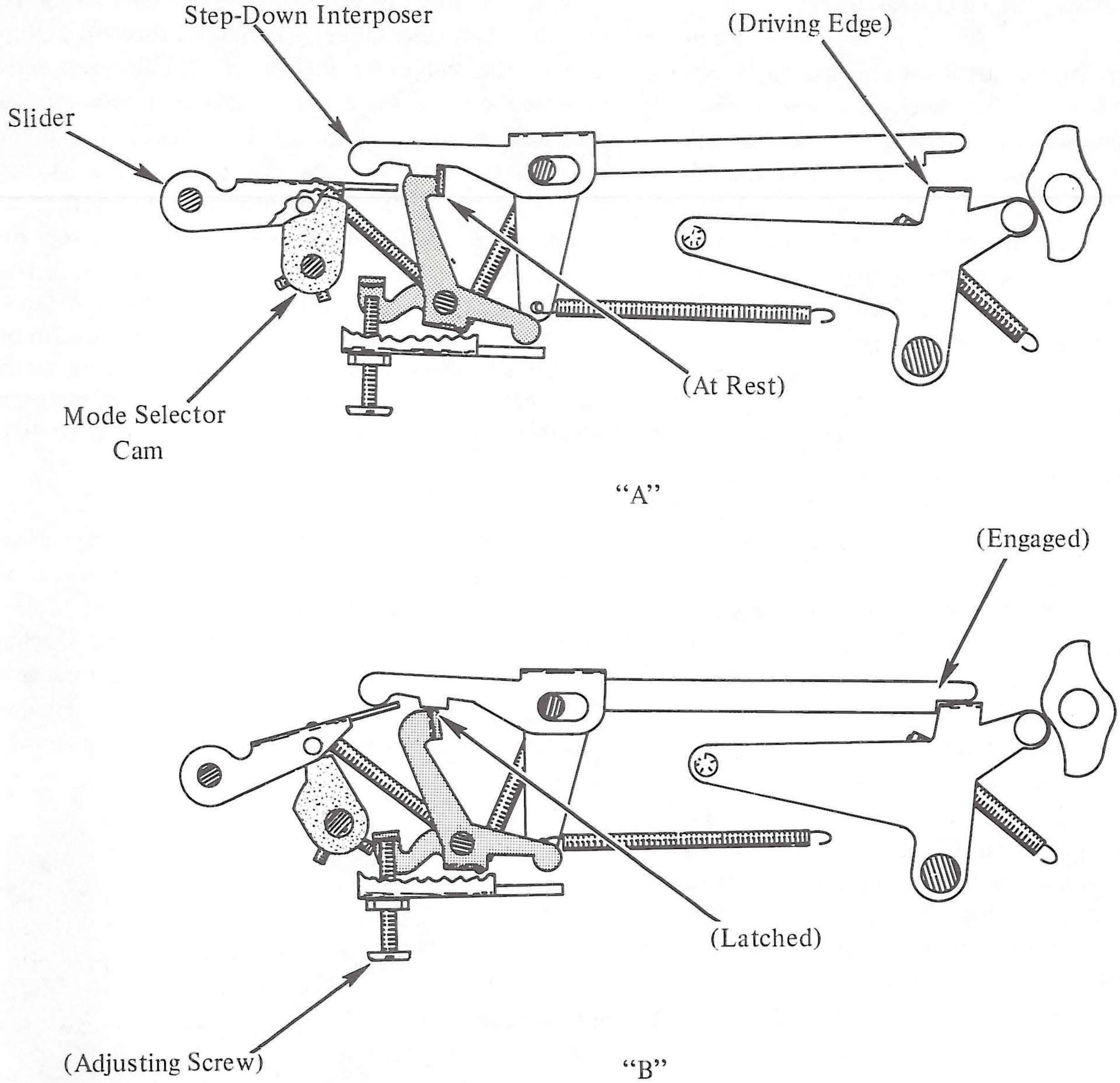


FIGURE 13-41

is powered forward by the cam on the filter shaft the driving edge of the follower passes beneath the interposer without contacting it. During a "write" operation the slider assembly, which is now positioned under the forward extension of the interposer, is cammed up at the rear by the mode selector cam during each spacebar operation, just as it is in the "read" mode. As the rear of the slider rises it lifts the forward extension of the step-down interposer up permitting the stepping latch to pivot top to the front into its latching position as shown in Figure 13-41B. The stepping latch will now hold the forward extension of the interposer raised. The adjusting screw which is threaded through the bottom of the step-down mounting bracket serves to limit how much of a bite the latch will take on the latching surface of the interposer.

With the forward extension of the step-down interposer latched in its elevated position, the rear portion of this interposer is positioned in the path of the driving edge of the justification cam follower. Operation of the cam follower will now drive the interposer forward on its elongated mounting holes. It is this motion that is used to perform the quantity dial step-down operation. Each time the interposer is powered forward the quantity dial steps down one increment. This is accomplished through a pawl and ratchet feed arrangement.

Before going into how the step-down operation is achieved, there is one other point that should be brought out at this time. At the end of each cycle the interposer must be restored back to rest. This means

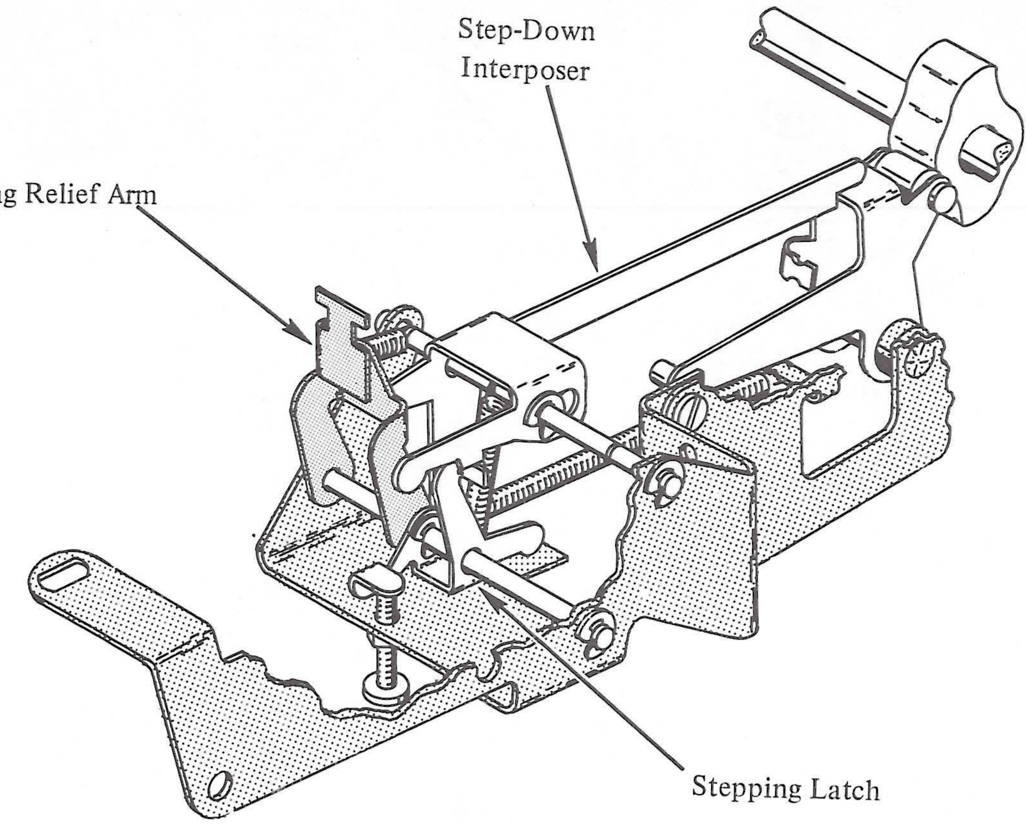


FIGURE 13-42

that the stepping latch has to be disengaged from the latching surface of the interposer. Notice that as the interposer is driven forward by the cam follower the stepping latch cannot follow its motion. Therefore, a knock-off action occurs. As the interposer is driven forward beyond the bite of the latch, the interposer becomes unlatched and returns to its inactive position. This unlatching action does not occur until the interposer has been driven almost to its limit. As the interposer is restoring to its rest position the lug on the interposer carries the latch to the rear with it. This puts the interposer and the latch back in the rest position. The motion available before the unlatching occurs is used to achieve the step-down operation.

As the step-down interposer is driven forward on its elongated mounting holes, it pushes on the back side of the spring relief arm (Fig. 13-42). This causes the arm to pivot forward about its mounting shaft. The spring relief arm mounts just to the left of the stepping latch on the same shaft that mounts the stepping latch. As the spring relief arm is driven forward it allows the stepping driver assembly to pivot counterclockwise about its mounting stud (Fig. 13-43). The driver assembly, which operates as one piece, consists of two arms connected together by a binding screw. The two arms may be adjusted in a scissor-like manner. The lower arm, called the stepping arm, operates against the rear face of the spring relief arm. A heavy hairpin spring anchored between the upper arm, which is the stepping driver, and the upper lug of the spring relief arm serves to load the stepping arm against the rear face of the spring relief arm.

When the step-down interposer is driven forward, it pushes on the spring relief arm causing it to pivot forward. The stepping arm, which is spring loaded against the rear face of this arm, follows it forward because of the heavy hairpin spring, causing the driver assembly to rotate counterclockwise. If by any chance the driver assembly is restricted from rotating, then the hairpin spring will absorb the movement of the spring relief arm. The purpose of this spring relief arrangement is to prevent damage to the system, if the driver assembly is restricted from rotating when the step-down interposer is powered forward. A positive drive mechanism in this area would leave the system vulnerable to damage because this motion is being used to step-down the exposed quantity dial on the keyboard. Because the quantity dial is exposed and manually positioned by the operator, it is possible that the operator might restrict its rotation during a step-down operation. The spring relief in the mechanism assures that no damage will occur to the system if this should happen.

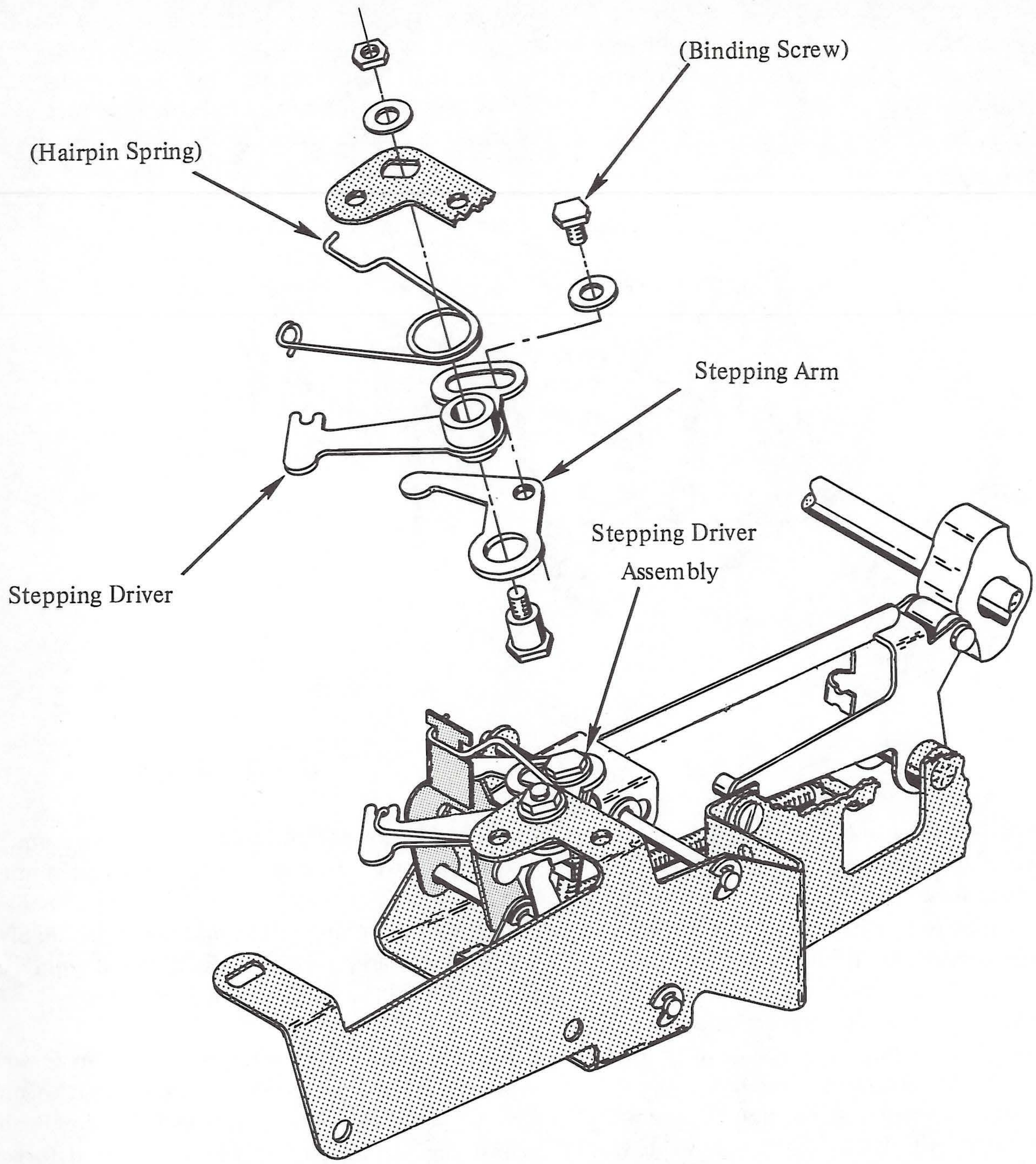


FIGURE 13-43

The driver assembly mounts on a shouldered screw on the underside of the justification bracket as shown in Figure 13-43. Counterclockwise rotation of this driver assembly causes the pawl carrier assembly to rotate clockwise. The pawl carrier mounts on and pivots about a hub on the underside of the justification bracket. It is spring loaded in the counterclockwise direction against the forward arm of the stepping driver by an extension spring (Fig. 13-44).

A stepping pawl mounts to the forward side of this pawl carrier by a pin and C-clip. This stepping pawl contains two pawl teeth. The lower tooth is aligned with the teeth on the spacebar value ratchet while the upper tooth is aligned with the teeth on the quantity dial ratchet. At appropriate times, in the "write" operation, these two pawl teeth will feed their respective ratchets. Figure 13-44 shows the mechanism in the rest position. The stepping pawl, although spring loaded in the clockwise direction, is being held out of engagement with the ratchets by means of the pawl disengage arm. The pawl carrier restoring spring is much stronger than the stepping pawl spring, therefore the stepping pawl is caused to pivot counterclockwise by the pawl disengage arm when the pawl carrier is returned to its rest position. The arm run-

ning along the outside of the stepping pawl (part of the pawl disengage arm) functions to dampen the kicking action that the pawl receives when it is restored against the pawl disengage arm. It, effectively, traps the stepping pawl into a rest position thereby assuring that the pawl will be ready for another operation immediately.

As soon as the driving action is applied to the pawl carrier by the stepping driver assembly, the stepping pawl begins to move forward away from the pawl disengage arm. As it does, the spring load on the pawl causes it to pivot clockwise into engagement with the ratchet teeth. Recall now, in the explanation of operating principles; after the justification data has been applied to both the quantity dial and value dial the operator begins to justify the line. Each time she strikes a spacebar, the quantity dial steps down one increment while the value dial holds its setting. When the quantity dial reaches the "one" position, the step-down mechanism is automatically set up so that at the same time the quantity dial steps from the "one" to the "zero" setting, the spacebar value dial steps down to the next lower value. All stepping action then ceases. From then on, all remaining spacebars in that line operate on this lower value. This entire operation is achieved through the stepping pawl.

The design of this mechanism is such that when the stepping pawl is rotated into its engaged position, only the upper tooth of the pawl engages in its ratchet. With the upper tooth of the pawl fully engaged (Fig. 13-44), the lower tooth of the pawl stands com-

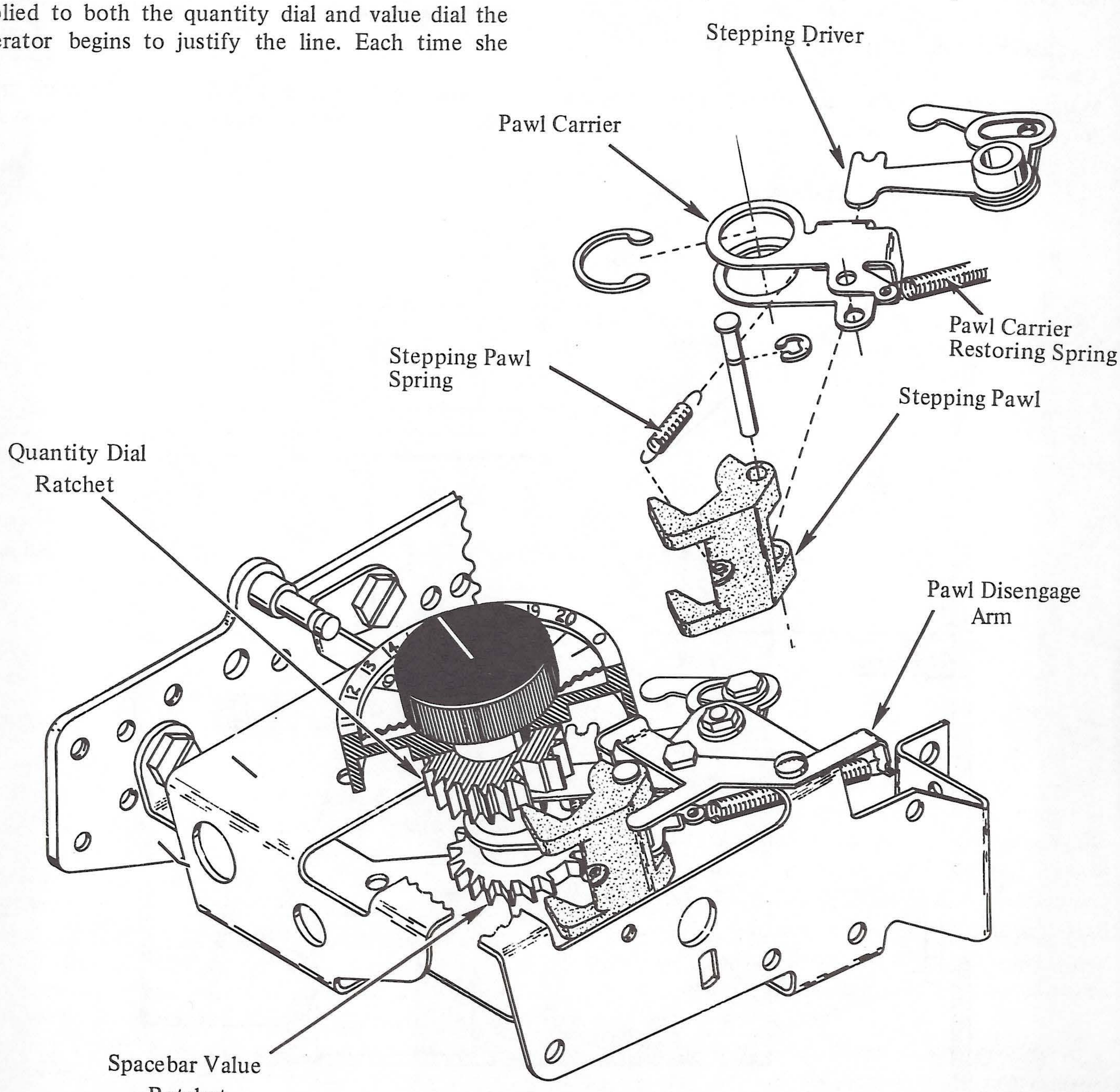


FIGURE 13-44

pletely clear of the ratchet teeth on the spacebar value ratchet. This is true as long as the quantity dial is not in its "zero" position. Each time the stepping driver assembly rotates, the stepping pawl causes the quantity dial ratchet to feed one tooth which is equal to one increment on the quantity dial. Since the lower tooth of the pawl is being held clear of the value ratchet, the value dial maintains its setting throughout this step-down operation of the quantity dial. Effectively, the only thing that is being accomplished at this time is a count-down operation. The quantity dial is keeping track of how many spacebars are occurring in the line. When the quantity dial steps to its "zero" setting a single step-down of the spacebar value dial must take place before the next spacebar operation occurs.

4. Spacebar Value Dial Step-Down Operation

At the same time the quantity dial is stepped from the "one" to the "zero" position, the spacebar value dial is stepped to its next lower setting. This operation is achieved through the design of the ratchet on the quantity dial. The ratchet tooth corresponding to the "one" position on the quantity dial has been cut deeper than any of the other teeth. The reason for this deeper tooth is to cause the stepping pawl to rotate further in the engaging direction as it begins to step the quantity dial from the "one" to the "zero" position (Fig. 13-44). This deeper engagement of the upper pawl tooth permits the lower tooth of the pawl to come into engagement with its ratchet. Now, as the stepping pawl begins its forward stroke to step the quantity dial from the "one" to the "zero" setting, the value ratchet will also be stepped down one tooth. The ratchet tooth corresponding to the "zero" position on the quantity dial has been removed. This prevents the ratchet from stepping beyond the "zero" position.

Since only a single step-down of the value dial is required, then further stepping action of the system

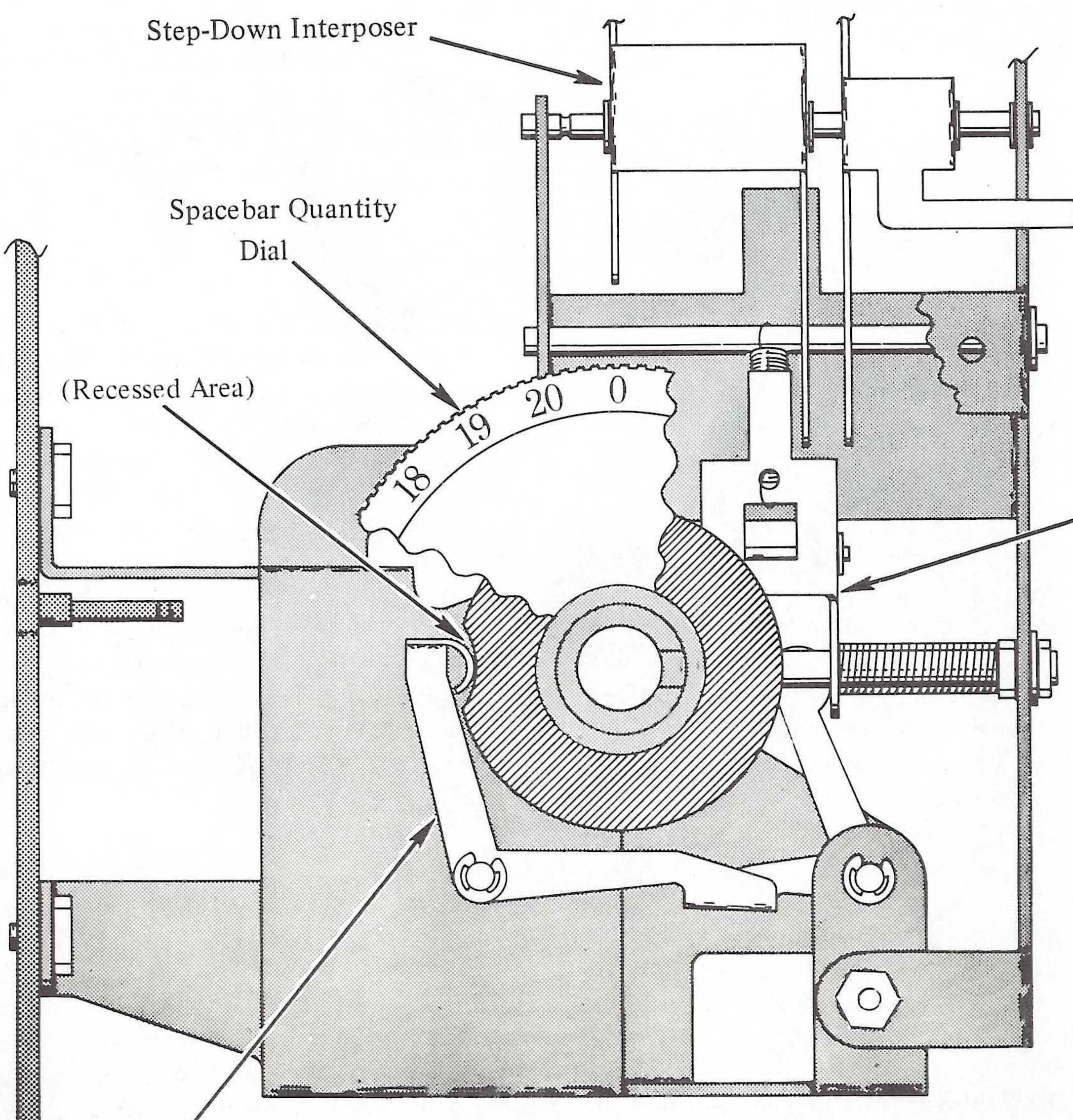


FIGURE 13-45

must be prevented. This is achieved through the selector lever. If you recall from earlier in this section, when the justification lever was initially pulled into its "write" mode the justification lever cam permitted the selector lever to rotate clockwise until the upper arm of this lever contacted the center hub of the quantity dial. At this time the tab on the rear of the slider assembly was positioned directly under the forward extension of the step-down interposer (Fig. 13-40). When the quantity dial steps to its "zero" position, the upper arm of the selector lever drops into a recessed area on the hub of the quantity dial. This permits the selector lever to rotate further in the clockwise direction, thus causing the slider assembly to shift further to the left on its mounting stud. The rear tab on the slider assembly, in this new position, is no longer beneath the forward extension of the step-down interposer (Fig. 13-45). Action of the slider by the mode selector cam can no longer latch up the step-down interposer, therefore, this entire stepping mechanism is isolated from its power source. The spacebar value dial, which has been stepped down only one increment, is left at this new setting for the remainder of this line or "write" operation.

Detenting of the spacebar quantity dial is accomplished in the same manner as that of the value ratchet. The quantity dial detent, which mounts on the same pivot stud as the value ratchet detent, operates against the ratchet teeth of the quantity dial ratchet. Like in the value ratchet, the quantity dial detent assures that the quantity dial will hold its proper setting whether set by the operator or by the stepping mechanism.

Notice that the spacebar value ratchet has a tooth missing in the position that corresponds to a two unit spacebar value. This is a safety measure. It prevents the stepping pawl from trying to step the spacebar value ratchet below the minimum value of three units. This condition would exist if the operator dialed in a value on the quantity dial and left the spacebar value dial set on three. With the machine in the "write" mode the stepping mechanism will attempt to step the value dial below three units as the quantity dial steps from the "one" to the "zero" position. Of course, no stepping action results due to the missing tooth on the ratchet.

This concludes the instruction on justification. At this time you should have a good understanding of the following operations:

a. Operating principles of the mechanism from an operator's standpoint.

b. "Read" selection - what happens mechanically when the operator pulls the justifier lever into the "read" position.

c. Indexing of the justification tube.

d. Homing of the justification tube to the zero index position.

e. Carrier position "read" operation.

f. Indicator tube restoring operation.

g. Margin reset operation.

h. "Write" selection - what happens mechanically when the operator causes the justifier lever to swing to its "write" position.

i. Manual rotation of the spacebar value dial.

j. Manual rotation of the spacebar quantity dial.

k. Quantity dial step-down operation.

l. Value dial step-down operation.

MISCELLANEOUS

1. Justification by Manual Computation

Each time the operator strikes a spacebar in the "read" mode the justification tube is indexed. This indexing operation causes a new color bar on the tube to be aligned with the indicator window. Effectively, what is happening is the justification mechanism is counting the number of spacebars that are occurring in the line. From this information along with the carrier measurement it automatically reflects what new spacebar values should be used to justify the line. Therefore, if an operator knew how many spacebars occurred in a typewritten line and how much additional space is needed to justify the line, she could manually compute the justification data necessary to justify that line. Occasionally an operator must do this.

You have probably realized by now that the amount of the justification zone, where the carrier's position with respect to the right hand margin can be reflected in the form of complete justification data, is directly controlled by the number of spacebars that have been used within that line. In other words, the usable amount of the justification zone for each line of type will increase with each spacebar that is added to the line up to a maximum of twenty. To explain

further; the variable spacebar mechanism can only expand a spacebar operation from three to nine units or a total increase of six units. Therefore, the mechanism will only reflect the proper justification data if the amount of space to be added to a line is equal to or less than six times the amount of spacebars that have been used in that line. Once the total amount of space that must be added to a line exceeds the capacity of the variable spacebar mechanism, which is six additional units per spacebar, the justification data must be gained through manual computation.

Manual computation can be done as long as the carrier has entered the justification zone and the operator knows how many spacebars have occurred in the line. To aid the operator in this manual computation process a spacebar counter has been provided. The counter is simply a numerical scale encircling the right hand end of the justification tube. The numbers on the scale run from zero to twenty; each corresponding to a color bar. A shield, called the spacebar shield, encircles the end of the tube covering all of the numbers except the one that corresponds to the color bar that is in line with the indicator window. A rectangular window in the shield permits this number to be exposed to the operator. Any time the operator desires to know how many spacebars she has used so far in a line, all she has to do is observe what number is present in the window.

Knowing the number of spacebars, she then reads the carrier's position in the justification zone by observing where the white vertical line located at the right hand end of the exposed color bar falls on the indicator scale. Now, let's simulate an example to show how this manual computation is done. The operator rough types a line and the carrier comes to rest somewhere in the justification zone. The operator then looks down at the indicator window to read the data. She finds that the color bar has not carried far enough to reach the left hand end of the indicator window. Immediately she realizes that the justification space that has to be added to the line to justify it exceeds the capacity of the variable spacebar mechanism. Therefore, she must manually compute the data. The exposed number in the window on the right hand end of the justification tube indicates that 4 spacebars have been used in the line and the white line cuts the 34 unit gradient mark on the indicator scale. Dividing 34 units by 4 spacebars, she comes up with an answer of 8 units/spacebar with 2 units left over. This means that to justify the line she must increase each of the spacebars by 8 units plus add the extra 2 units somewhere in the line. If 8 units are added to each spacebar this would bring the unit value of each spacebar up to 11 units, which is beyond the capacity of the variable spacebar mechanism. The extra 2 units should be added to the first two spacebars which would make the four spacebars have the values of 12, 12, 11, and 11.

These spacebar values can be obtained in several ways. The 12 unit spacebars can be gained by setting the value dial at 6 units and then striking the spacebar twice to produce a 12 unit space. The 11 unit spacebar can be achieved by adding a single unit backspace to the two 6 unit spacebars. If the operator doesn't care to use the backspace she can gain any desired space by combining different spacebar values through manipulation of the value dial. She can also obtain desired spacing through the "no print" feature of the machine. Typing a "w" plus an "i" in "no print" will produce eleven units of space.

There are many other justification situations that call for specific methods of manual justification. Once you have obtained a sound working knowledge of the escapement system, you should easily be able to understand these different procedures as the operator describes them to you.

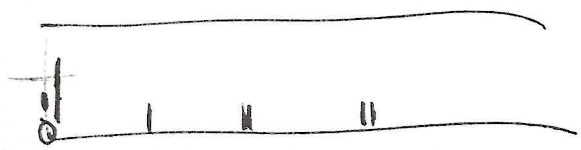
2. Corrections

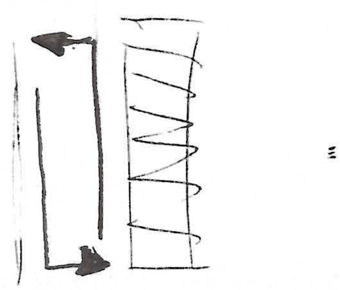
Occasionally an operator will make a mistake while typing out her rough copy. Unless she backspaces through a spacebar the justification data produced at the end of the line will still be correct. If she has backspaced through a spacebar to make the correction and then added the spacebar again after making the correction, the justification data will be incorrect. The justification tube will have counted both spacebars while the copy shows just the one. The wrong color bar will be in the indicator window.

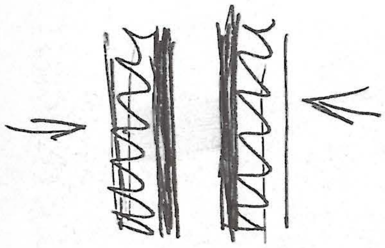
There are two ways of compensating for this situation. An operator can obtain the proper data by manually rotating the indicator tube top to the rear to expose the previous color bar in the indicator window. She then reads the justification data using this color bar. Once the data has been read, she restores the indicator tube back to its detented position. This method is recommended only when one extra spacebar has been counted. When more than one extra spacebar is going to be used in a correction the recommended method is to take the justifier mechanism out of the "read" mode while the extra spacebars are being added. This is done with the justification lever. Once the operator has made the correction, she pulls the justification lever back into the "read" position and continues.

3. Indenting

Whenever possible, indenting should be done through a tab operation. If the indenting amount required is either more or less than 1/6", then the "no print" feature is usually used. The operator selects one or more characters which have a total escapement value equal to the desired indenting value. Now, when she types her rough copy of this indented line, she begins the line by typing the selected characters first so that the indented space will be accounted for in the justification data. On the justification typing, she begins at the left hand margin typing out these same characters first, except this time they are typed in "no print". Thus, the exact amount of indentation is achieved without upsetting the justification process. The spacebar should not be used for indenting as it is directly involved in the justification process.







MARGINS, SCALES, AND BELL

1. Margins

There are two margin racks on the "Selectric" Composer. The left hand margin rack, which is a six pitch rack, serves the same function as the margin rack on the standard "Selectric" Typewriter. It carries the left hand margin stop, produces the unlatching motion required to unlatch the carrier return clutch at the end of a carrier return operation, and it plays an active part in the margin release mechanism. The right hand margin rack, which is the 12 pitch rack, functions as part of the justifying mechanism. It is completely independent of the left hand margin rack.

Both the left and right margin racks mount at each end to the justifier mounting plates. The left hand rack mounts in the same manner as the margin rack on the standard "Selectric" Typewriter. Spindle-like ends mount in holes in the justifier mounting plates so that the rack is free to both slide and pivot. Like on the "Selectric" Typewriter, the rotational position is controlled by the margin release mechanism and the lateral position by the margin rack overbank guide. A compression spring on the left end loads the rack towards the right.

The right hand margin rack, which is mounted directly above the left hand rack, is mounted in the same manner except it is immovable. A right angled bracket fastened to the inner face of the left hand justifier mounting plate anchors the rack rigidly in place. Two screws anchor the rack to this bracket.

The margin release mechanism is the same mechanism as on the Model 725 "Selectric" Typewriter.

When resetting the right hand margin, always return the carrier to the left hand margin first. This returns the justifier mechanism to its rest position which it must be in before the margin can be reset because of an interlocking action.

2. Scales

Excluding the three indicator scales on the indicator tube there are 5 linear scales on this machine: the margin set scale, paper table scale, carrier position scale, centering scale, and layout scale (Fig. 14-1). All of these scales are graduated in 1/12 inch increments except the layout scale which is graduated in 1/6 inch increments. The numerical markings on all scales indicate 1/6 inch increments.

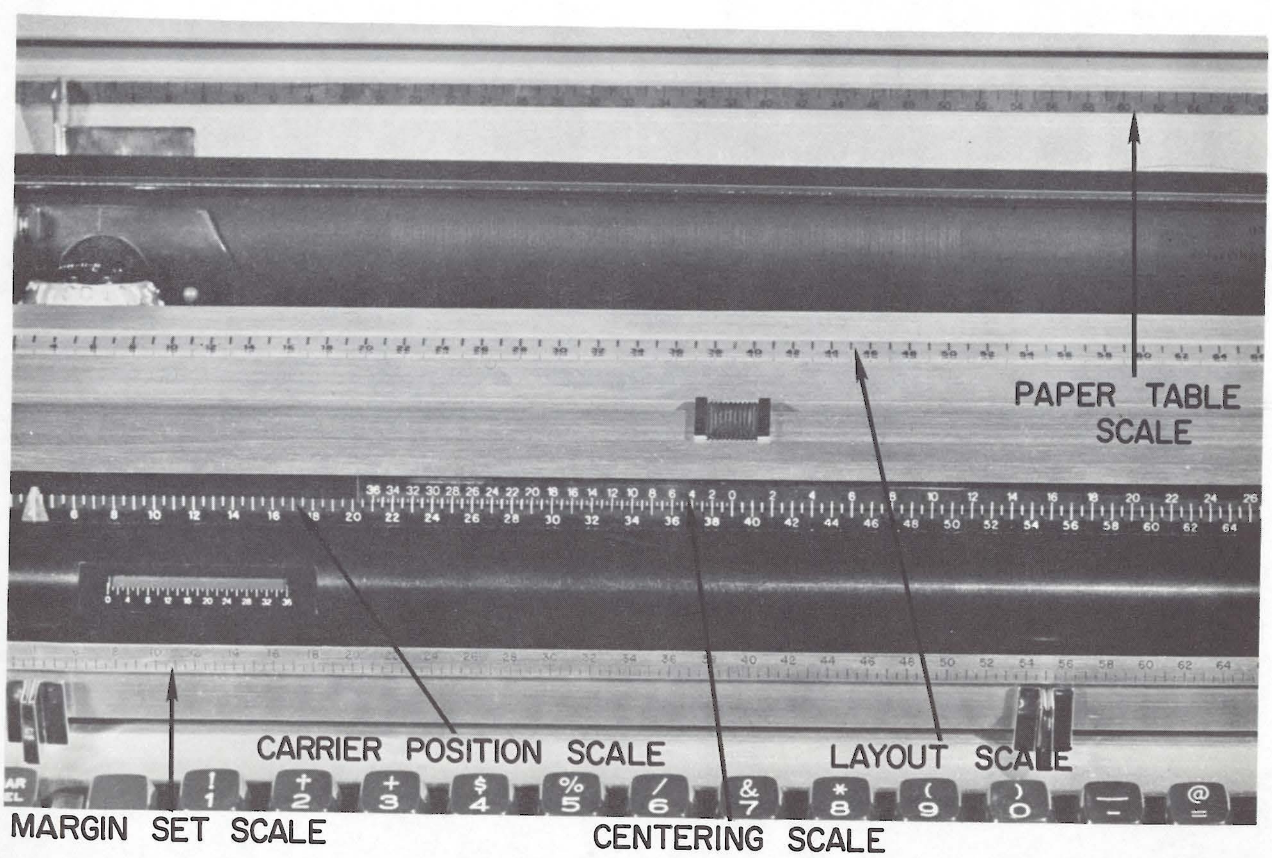


FIGURE 14-1

The layout scale located in the safety guard is grease pencil receptive and is generally used for the logging of formatting information. It has a friction fit in a groove in the safety guard and may be easily removed by the operator by opening the guard to its vertical position and then sliding the scale out the right side. Removed from its guard it may be used for layout work.

The floating centering scale is located just above the carrier position scale. The gradient marks on the centering scale are located so that they are superimposed behind the gradient marks on the carrier position scale. This permits the position of the red carrier pointer to be read on both scales.

Because the centering scale is movable, centering on the "Selectric" Composer is easier than on the "Executive" Typewriter. To center, the operator merely locates the center of her line and then places the carrier at this center point. She then slides the centering scale so that the zero mark on the centering scale is aligned with the carrier pointer. The no-print button is depressed and then the information to be centered is typed. The position where the carrier stops is then read on the centering scale. Without moving the scale, the carrier is backspaced to the same reading on the scale located to the left of zero. The no-print button is released and the information is then typed out centered.

3. Bell

The bell mechanism is the same as on the standard "Selectric" Typewriter. The bell is adjusted to ring just as the carrier enters the mechanical justification zone. This is approximately 3/4 inch from the right hand margin.

PAPER FEED

The paper feed mechanism on the "Selectric" Composer is primarily the same mechanism as on the Model 725 "Selectric" Typewriter.

To assist the operator in aligning the paper during insertion, paper stackers have been incorporated in the area of the rear feed rollers. These stackers are mounted on pivot studs on the paper feed mounting arms (Fig. 15-1). They have a series of fingers along their lower edge that serve to align the paper. When the paper release lever is pulled forward to disengage the feed rollers, the paper stackers pivot forward against the platen. The fingers on the stackers pass through holes in the paper deflector before coming to rest against the platen. When the paper is inserted down between the platen and rear feed rollers, it comes to rest squarely against the stacker fingers. The operator then gently slides the sheet of paper to the left against the paper guide. Releasing the paper release lever causes the rear feed rollers to engage the paper and then, immediately following, causes the stacker fingers to be retracted through the holes in the deflector. The paper remains perfectly aligned.

The feed rolls on the "Selectric" Composer are free to rotate independently about their respective shafts, as in the Model "D". This arrangement prevents paper skew due to the increased pressure required to print on the composer because of its broader, heavier typestyles.

There are two feed roll shafts for the rear feed rolls. Each shaft contains three feed rolls. A clip on either side of each feed roll positions the feed rolls on each shaft and limits their end play. The front feed rolls have the same arrangement except the clip on the outside feed rolls of each shaft are smaller in length. This is because the front and rear shafts are of different lengths.

To prevent jamming the paper against the paper bail as it is rolled up to the writing line, a bail opener link has been added from the paper release lever to the right hand paper bail lever. When the paper release lever is pulled forward for paper insertion, the link toggles the paper bail to its "open" position. The long slot in the link allows the paper bail to remain in its "open" position when the paper release lever is returned to the rear (Fig. 15-2). The paper bail then operates as usual. The operator can close it manually after the paper has moved up beyond the bail.

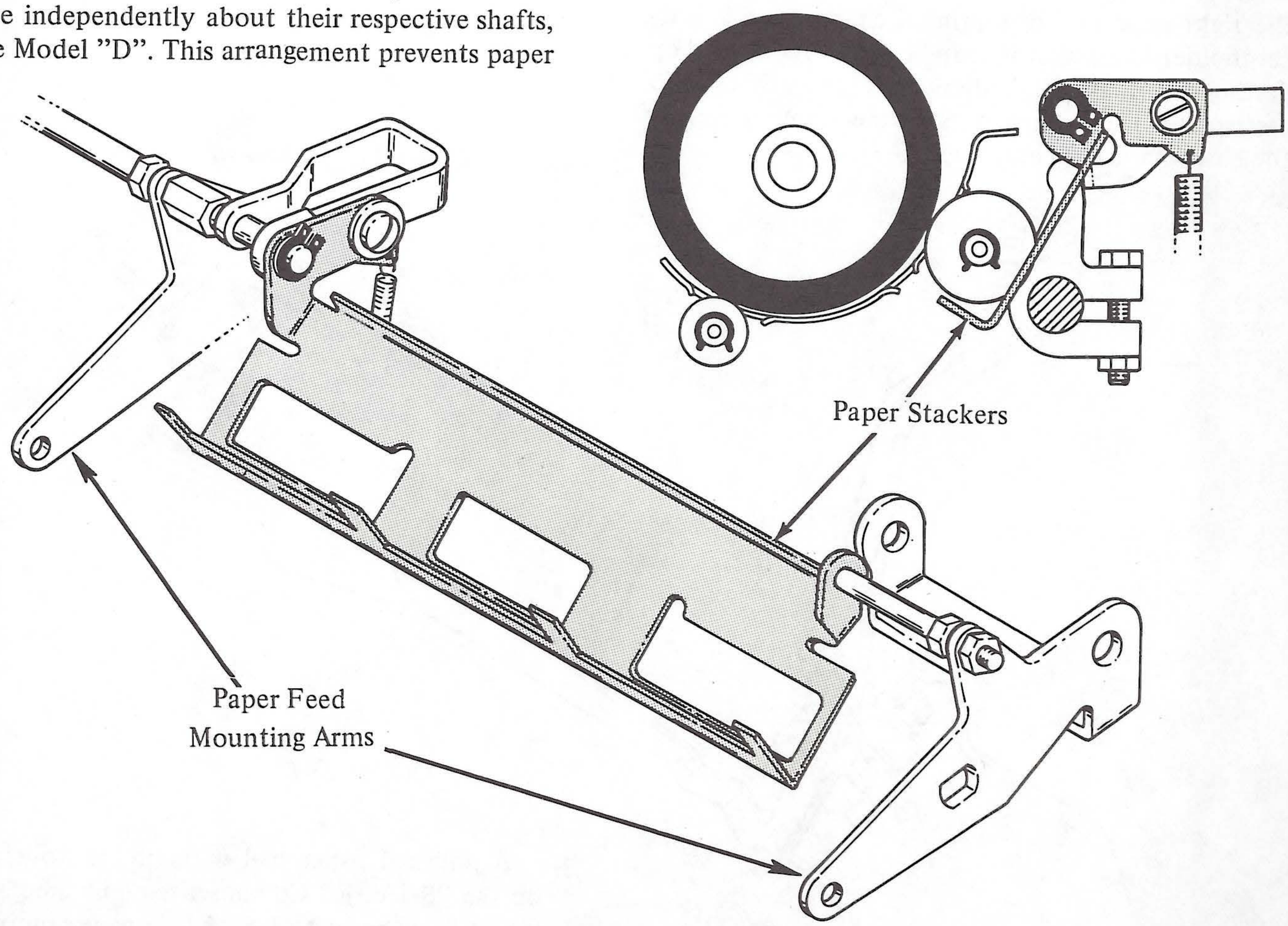


FIGURE 15-1

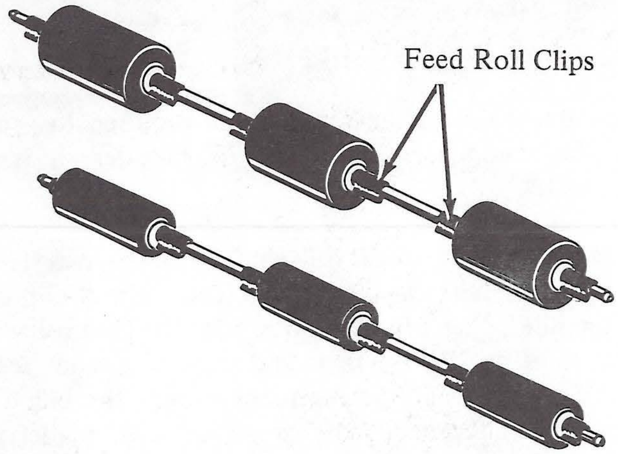


FIGURE 15-2

Because of the proportional spacing of characters the cardholder is designed so that the operator can check the position of the carrier with the cardholder. The cardholder mounts on a sliding member that is spring loaded toward the left. Whenever the operator desires to check the position of the carrier she merely pushes on a thumb tab on the face of the cardholder sliding the cardholder to its extreme right position. In this position a vertical scribe line on the cardholder reflects the exact position of the carrier with respect to the writing line. Like the repositioning indicator on the "Executive" Typewriter, this scribe line is located so that, when held to the right, it aligns with the right hand face of a printed character. When the cardholder is released it snaps back to its normal operating position. The cardholder is generally used for carrier alignment when outside the memory span of the character backspace. (Fig. 15-3).

Vertical repositioning can be accomplished by alignment of the bottom of the character with the horizontal scribe line on the cardholder. The plastic cardholder is designed with snap-on slots so that it can be removed easily by the operator for cleaning. This feature also allows quick replacement with no loss of adjustment.

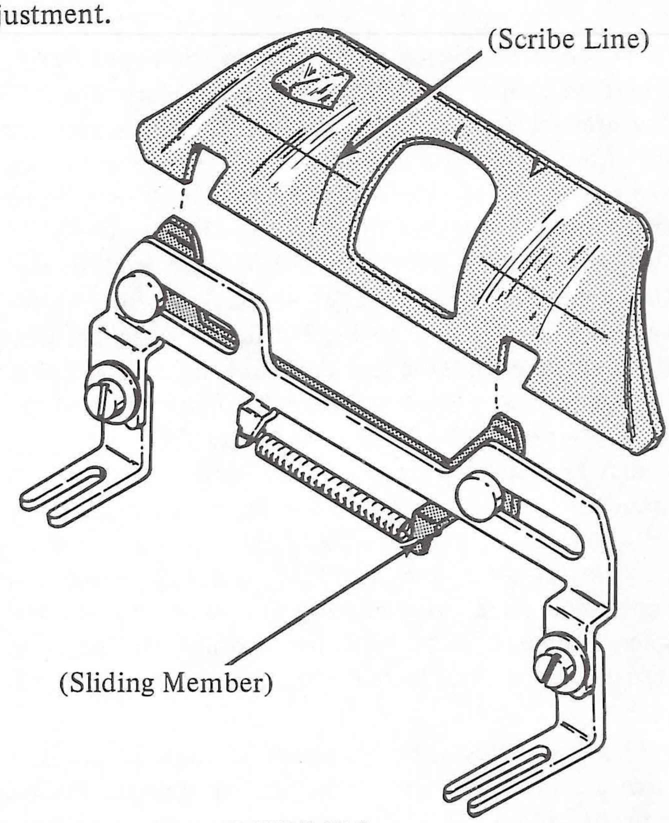


FIGURE 15-3

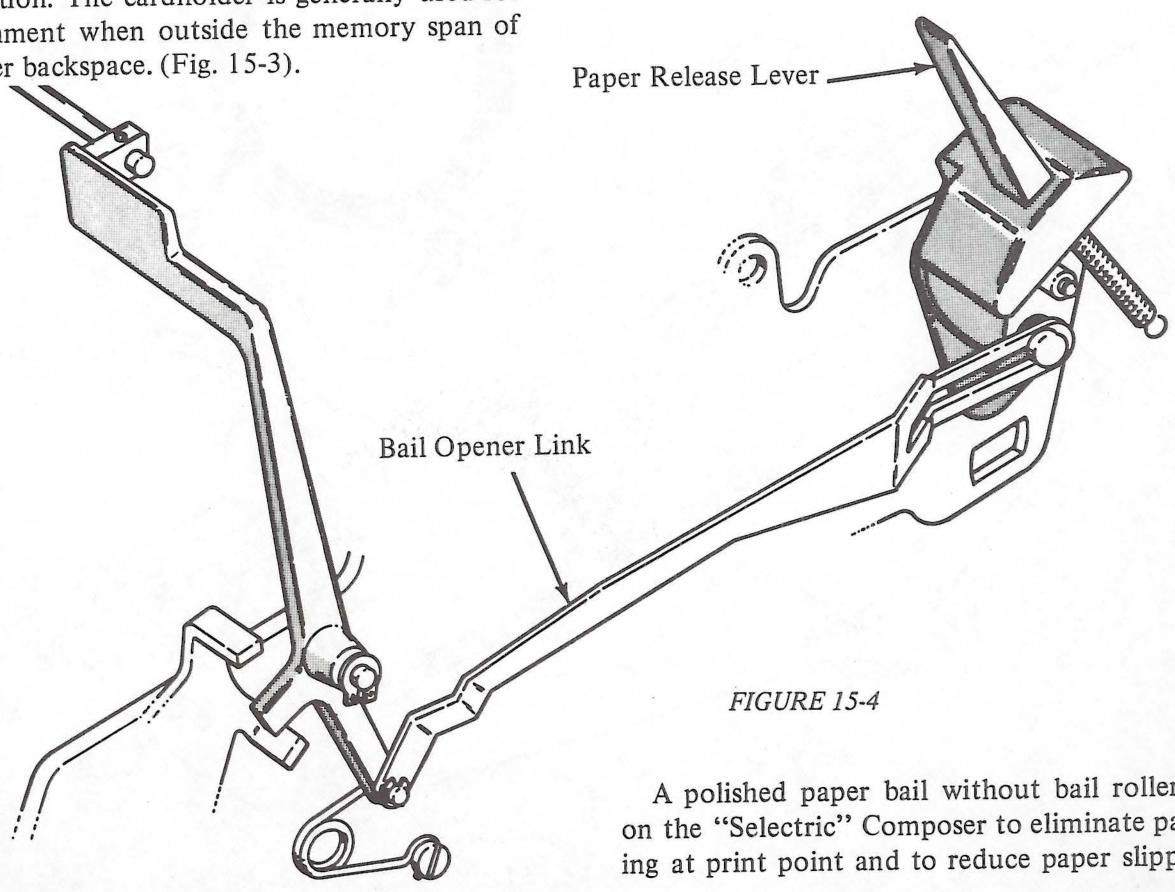


FIGURE 15-4

A polished paper bail without bail rollers is used on the "Selectric" Composer to eliminate paper bulging at print point and to reduce paper slippage.

Form No. 241-5356-1
Printed July, 1968

COVERS AND MOUNTS

The covers on the IBM "Selectric" Composer are "snap-off" covers that operate exactly the same as the "snap-off" covers on the "Selectric" Typewriter. The only portion of the "snap-off" hardware that differs from the standard machine are the rear shock mounts and mounting brackets. Figure 16-1 illustrates the differences.

The top cover, which acts as a paper stand in the "open" position, pivots on two brackets that are mounted to the underside of the center cover. Each bracket is anchored to the cover by two binding screws. A pin at each end of the top cover mounts and pivots in an open slot in the brackets. A heavy spring connected between the pin and the bracket keeps the pin against the rear of the slot (Fig. 16-2).

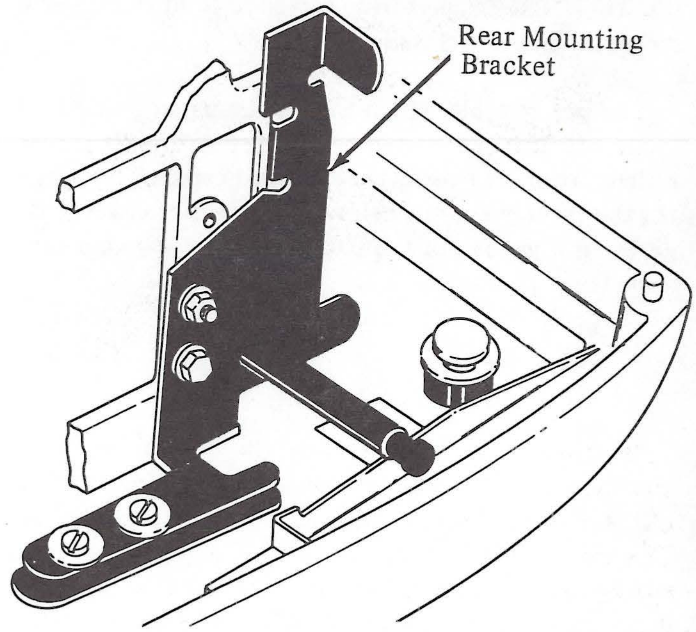


FIGURE 16-1

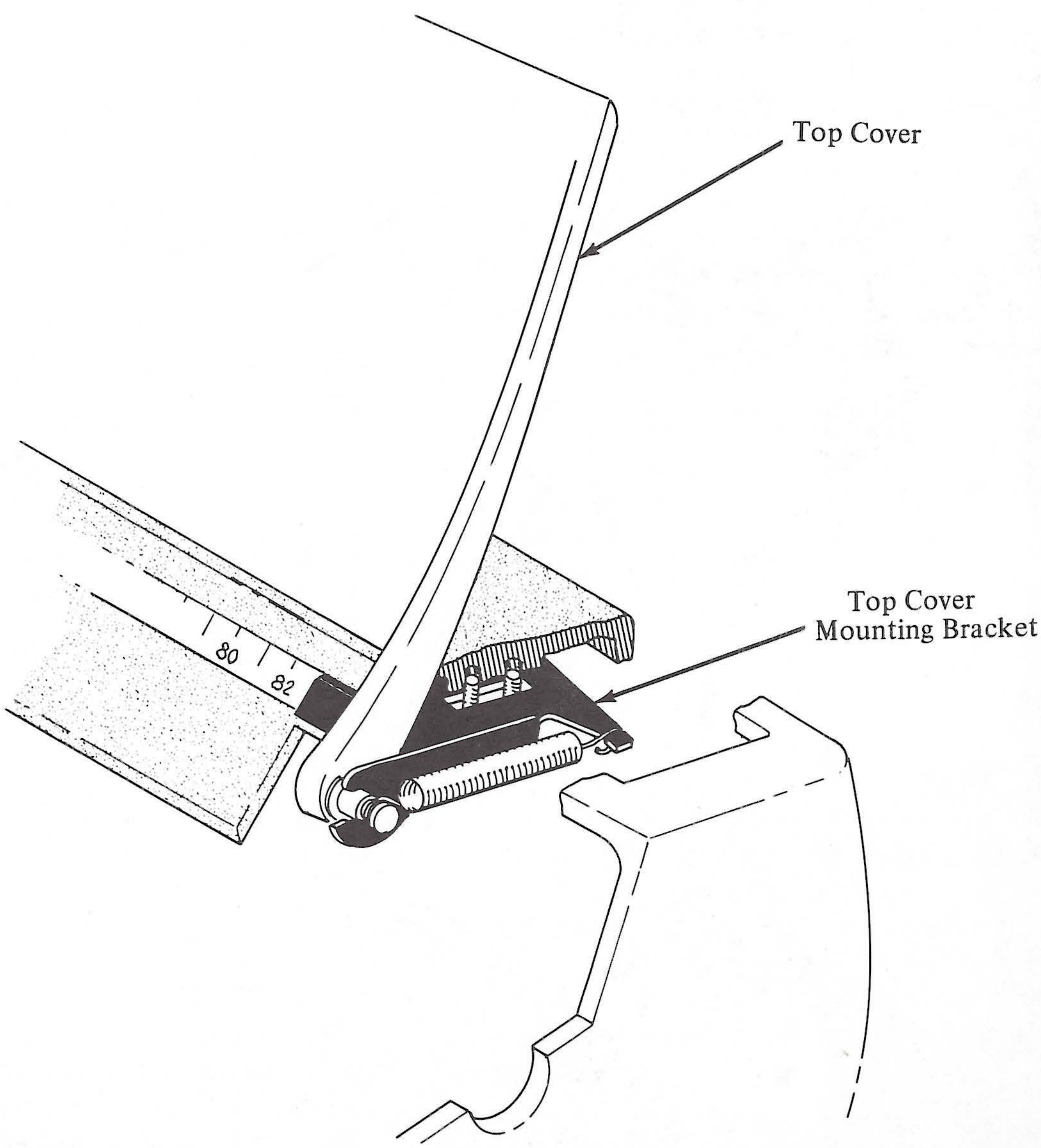


FIGURE 16-2

The platen saddles, or platen end covers, are anchored to the center cover by a hinge as shown in Figure 16-3. The toggle spring serves to hold the cover in either its open or closed position.

The paper table which carries the paper guide is attached to the center cover by three screws. It is positioned front to rear so that the end caps, or cushions, for the top cover are flush with the center cover. Also, glued in a groove of the paper table is the paper table scale (Fig. 16-4).

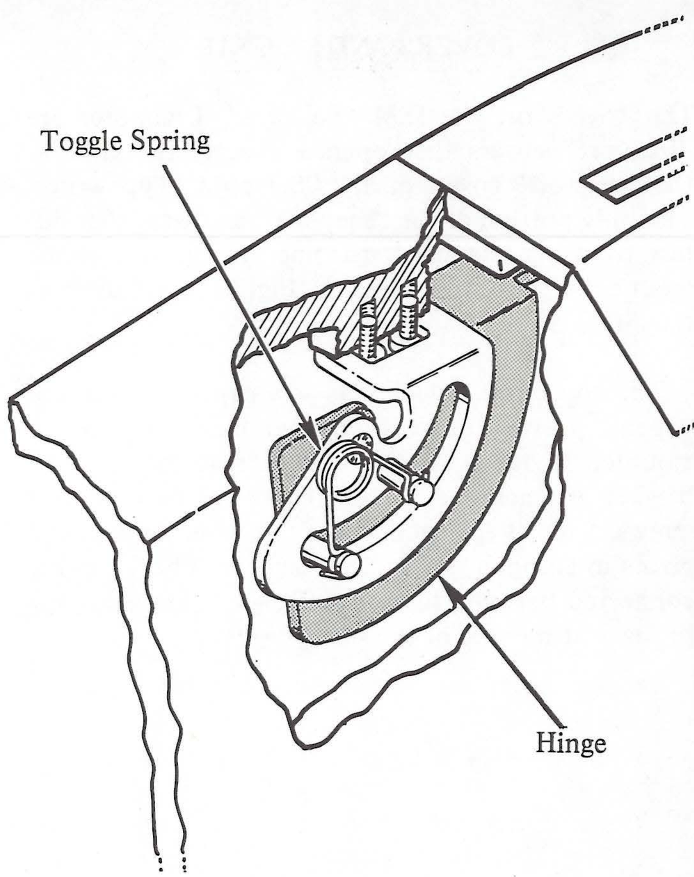


FIGURE 16-3

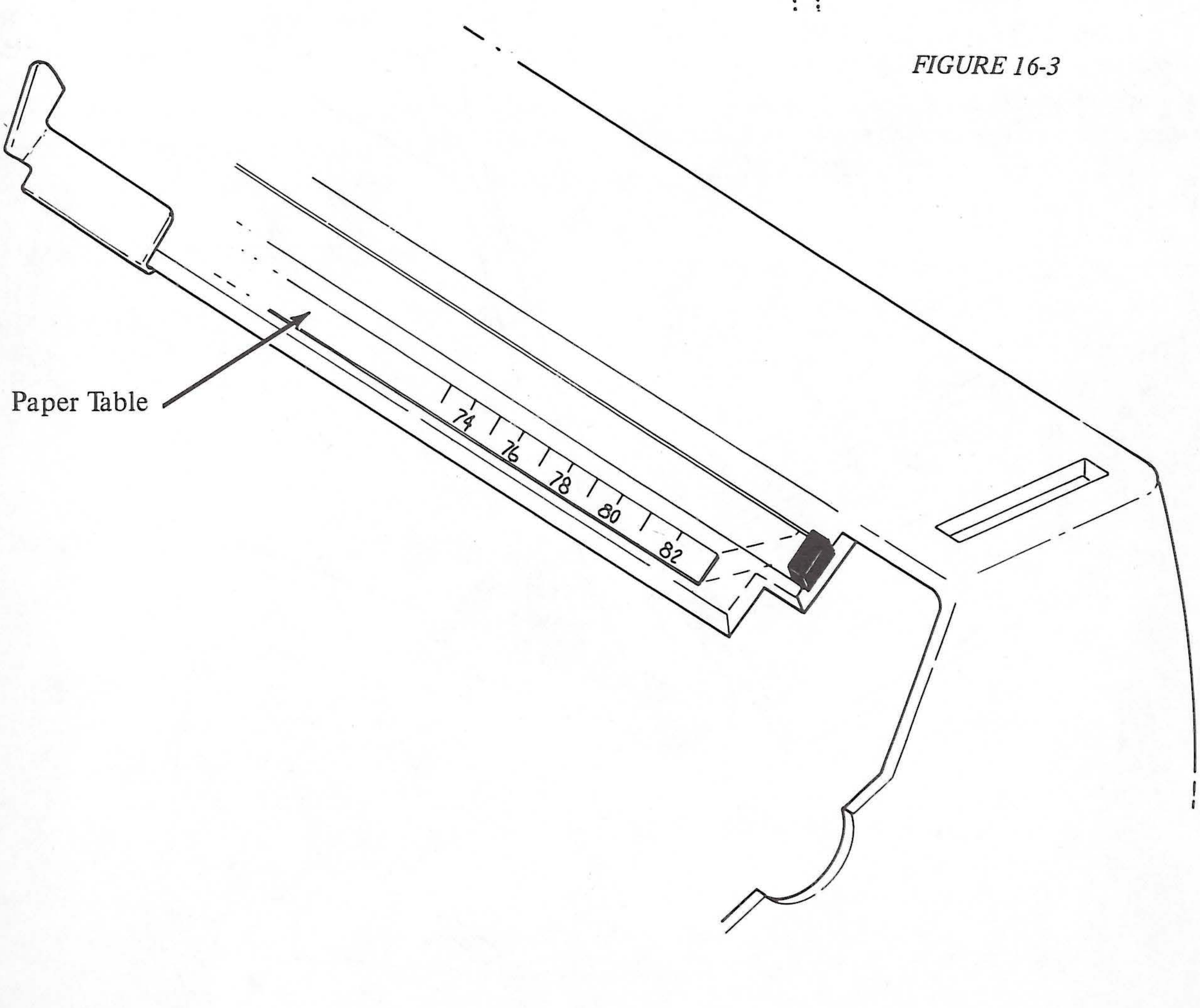


FIGURE 16-4

Form No. 241-5498-0
Printed July, 1968

INTERLOCK BAIL

The interlock bail has two functions:

1. When it is rotated it prevents a print operation because the lug on the cycle clutch interlock pawl restricts the cycle clutch control lever from going to the rear (Fig. 17-1). The interlock bail may be rotated by the following parts which are fastened to the bail.
   a. Carrier return interlock bellcrank is rotated by the carrier return keylever.
   b. The shift interlock bail bellcrank is rotated by the shift interlock transfer arm.
   c. The interlock latch plate is rotated by the character backspace latch or the backspace keylever, aided by the backspace interlock latch until the backspace interposer restores.
   d. The clutch interlock bellcrank rotates from the motion of the carrier return shoe arm soon after the carrier return cam starts its rise.

2. The interlock bail is restricted from rotating during a print cycle because the cycle clutch control lever is under the lug on the cycle clutch interlock pawl. If the interlock bail cannot rotate the following functions are interlocked:
   a. The carrier return keylever cannot be depressed due to the carrier return interlock bellcrank coupled with the flex in the design of the keylever assembly.
   b. Backspace and character backspace because their keylevers cannot be depressed due to the interlock latch plate.

NOTE: Because the Backspace and Character Backspace do not have the flex in their keylever assemblies, they may be depressed if great force is applied.

Therefore, the lockout latch is provided to latch the interlock latch plate into position when a print operation is in progress.

SAFETY INTERLOCK

A safety guard, mounted to the machine cover behind the Justifier assembly, functions as a shield for the carrier (Fig. 17-2). It prevents the operator from accidentally placing her hand in the path of the carrier during a carrier return operation. The guard, called the carrier return interlock guard, is mounted such that an operator must pull the guard open in order to get at the carrier to change a ribbon. When she does this an interlocking action to the carrier return clutch latch mechanism takes place. The action produced is similar to that produced by the cover interlock on the standard "Selectric" Typewriter.

It is not necessary to open the guard to change the typing element, change the impression setting, or operate the stencil lever.

The interlock guard hinges on two brackets mounted to the underside of the machine cover (Fig. 17-2). Grip retainers on the pivoting pins at each end control the lateral position of the guard. A detent spring sandwiched between the underside of the cover and the

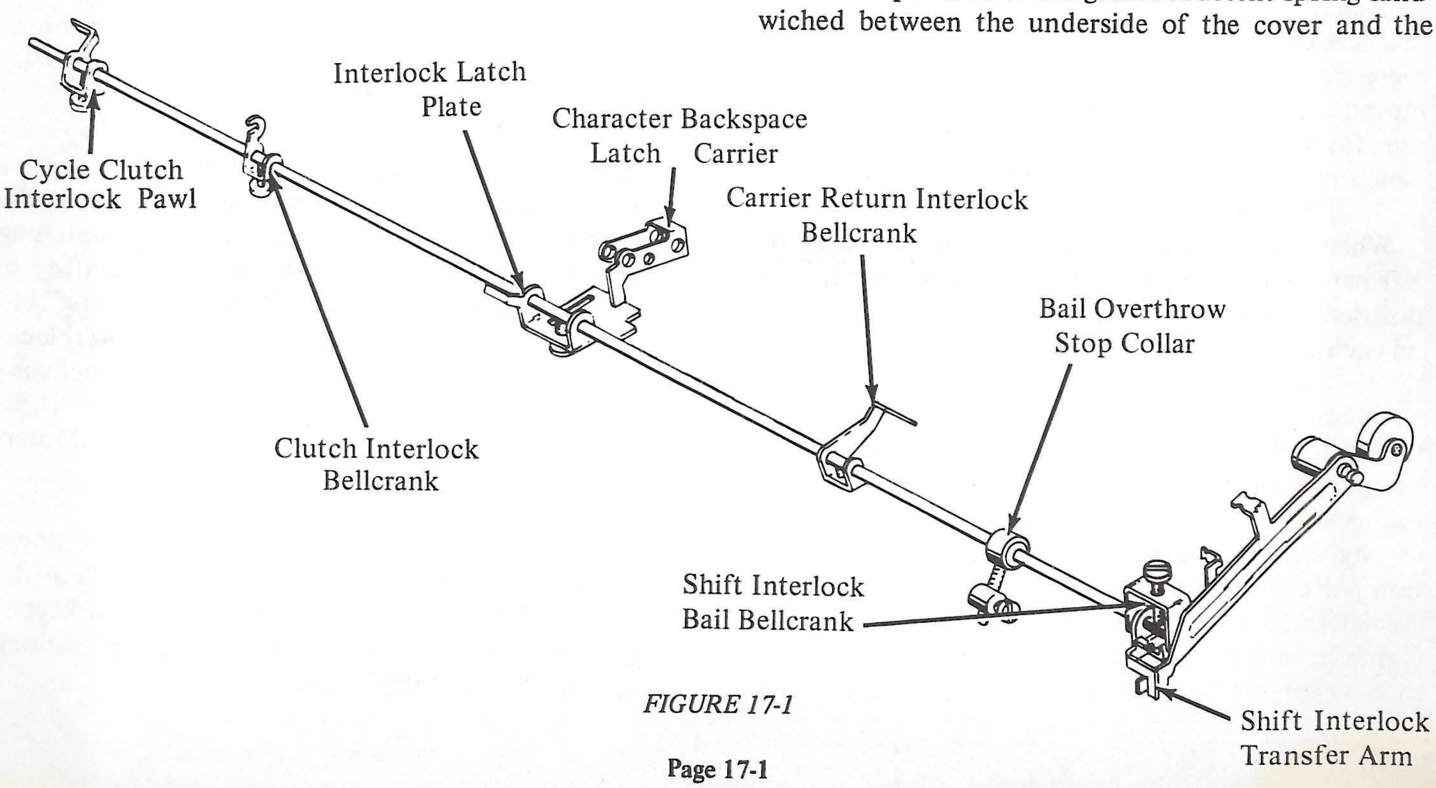


FIGURE 17-1

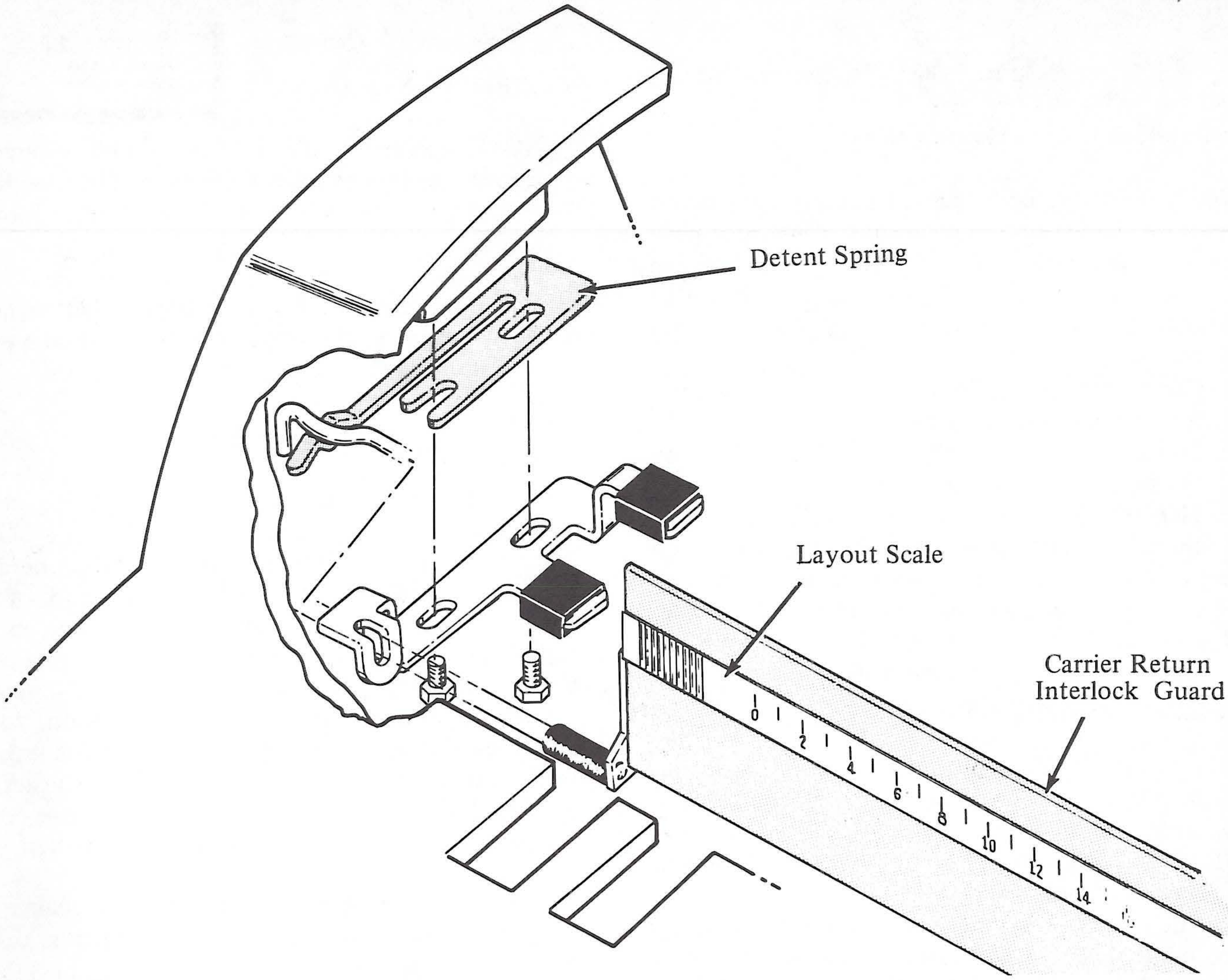


FIGURE 17-2

left hand mounting bracket serves to detent the guard in a vertical position so that the layout scale, stored in a groove on the top side of the guard, can be easily removed and re-installed. The layout scale is primarily used for logging of formatting information. It is grease pencil receptive and is graduated in 1/6" increments.

When the guard is closed a cushioneu lug on the left hand mounting bracket serves to control the rest position of the guard. Two other cushioned stops, one on each bracket, serve as downstops for the top cover.

Opening and closing this guard actuates the safety interlock. When the guard is opened the right end of the guard allows the carrier return interlock link to rise as shown in Figure 17-3. This link is guided at the top by a bracket fastened to the right hand justification plate by two screws. The lower end of the link is guided by a small plate secured to the carrier return clutch unlatching bellcrank pivot stud. The pivot stud threads into this guide plate. A hairpin spring, mounted on a shoulder of one of the screws that mounts the upper guide bracket, loads the interlock link up (Fig. 17-2 .

When the guard is "open" the interlock link is in its "up" position. In this position the lower tip of the link rests directly behind an arm on the unlatching bellcrank preventing the bellcrank from rotating in the counterclockwise direction. If the unlatching bellcrank is restricted from rotating in the counterclockwise direction then the carrier return latch keeper cannot move to the rear into its holding position. Thus, the carrier return clutch cannot be latched and interlocking is achieved.

Closing the guard drives the interlock link down moving its lower tip out of the operating path of the unlatching bellcrank. The carrier return latch keeper may now move to the rear to perform its latching function without interference.

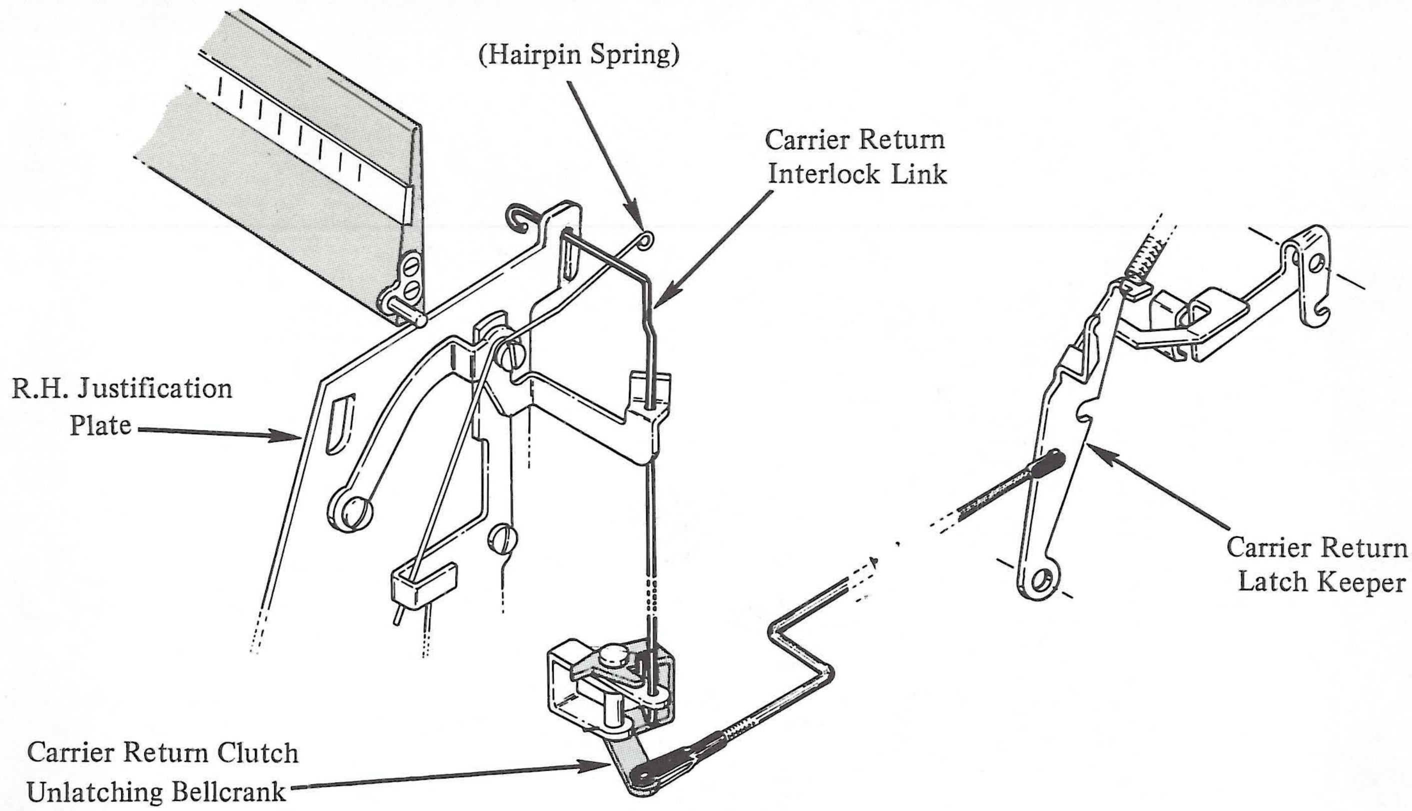


FIGURE 17-3

SHIFT INTERLOCK

The shift interlock is the same as the interlock on a Model 725 "Selectric". It functions to inhibit a shift operation while a print operation is underway.

BACKSPACE OVERBANK INTERLOCKS

The purpose of the backspace overbank interlock is to limit how far the carrier can be backspaced into overbank. This is accomplished by camming the Backspace and Character Backspace keylevers forward into their disengaged positions. The motion is transferred from the left hand margin rack.

TAB/CARRIER RETURN INTERLOCK

The tab/carrier return interlock provides the "catch tab" feature. It allows the tab to unlatch a carrier return operation. The interlock is located on the right end of the tab torque bar; and unlatches the carrier return latch when tab is operated.

RIBBON LOCKOUT

Ribbon lockout is simply there to conserve ribbon. It prevents ribbon feed in no-print and spacebar operations. The ribbon feed lockout lever prevents the ribbon feed cam follower from going to the rear thereby inhibiting the feed.

RIGHT HAND MARGIN INTERLOCK

This interlock prevents setting the right hand margin if the indicator tube is not in its rest position. A recessed area on the sensing rack must be aligned with a vertical lug on the margin slider to set the margin.

KEYBOARD LOCK

This lock conditions the interposer latch pawls to cam to the front of the machine when a print keylever is depressed if the lockout bail is in its active (machine off) position. Since the interposer latch pawls are cammed to the front they cannot latch down under the latch plate. This prevents a print cycle.

Form No. 241-5499-0
Printed July, 1968

RULING FEATURE

This feature provides the "Selectric" Composer with the ability to prepare finished "form" copy when using a ruling font.

The ruling font contains eight horizontal and four vertical rules. These twelve rules are the only characters on the font. The ruling font contains the following rules:

Rule	Pos.	Case	Horiz.	Vertical
1. Hairline	39	UC	X	
2. 1/2 Point	3	UC	X	
3. 1/2 Point	12	LC		X
4. 1 Point	7	UC	X	
5. 1 Point	16	LC		X
6. 1 1/2 Point	11	UC	X	
7. 1 1/2 Point	20	LC		X
8. Parallel	27	UC	X	
9. Parallel	24	LC		X
10. Dot Leader	36	UC	X	
11. Square Dot Leader	36	LC	X	
12. Dash Leader	39	LC	X	

Six repeat keylevers provide the typamatic action to the eight horizontal rule positions. Two of the horizontal rules have both an upper case character and a lower case character. Nine dual keybuttons (keybuttons containing both a character and a ruling feature character), plus one former keybutton (in position 39) are used to designate ruling font keybutton locations.

Each horizontal ruling position has a repeat keylever. The repeat keylever consits of three pieces; a keylever, a bellcrank, and a pawl (Fig. 8-1). The bellcrank is riveted to the right side of the keylever by two rivets. The bellcrank is free to pivot about the rear rivet within the limits of the elongated slot that the front rivet is mounted through. The bellcrank is spring loaded up at the rear by a spring located between the rear extension of the bellcrank and the keylever.

As the keybutton is depressed the keylever moves downward and the keylever pawl, which is mounted on the rear of the bellcrank and spring loaded top to the rear, drives the interposer latch pawl downward to trip off the cycle clutch (Fig. 18-2).

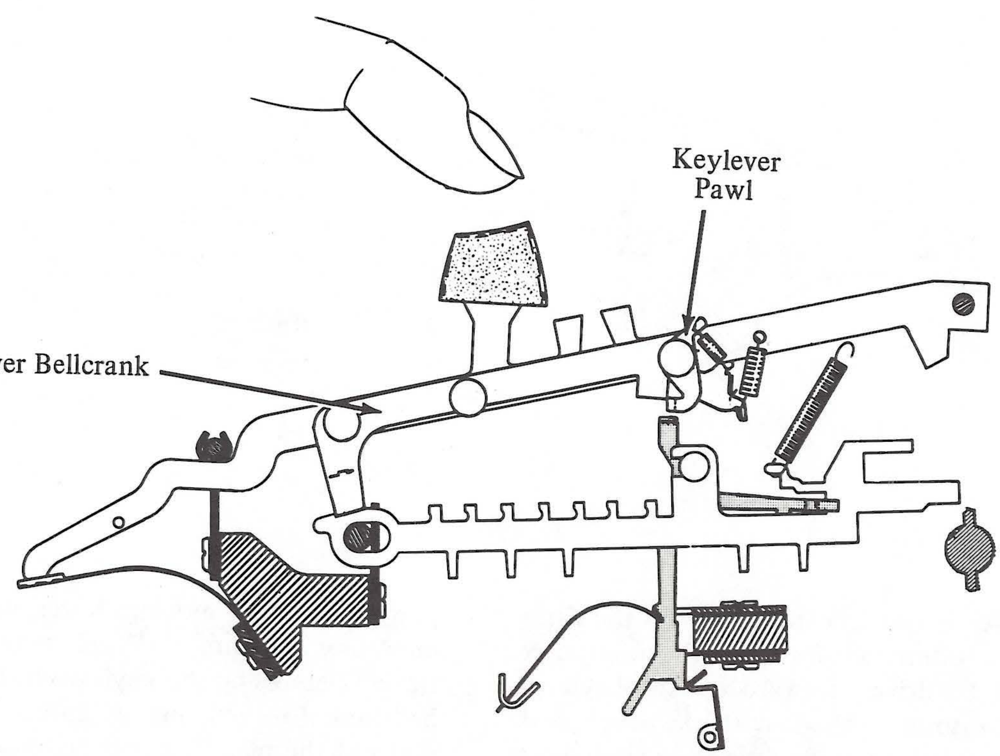


FIGURE 18-1

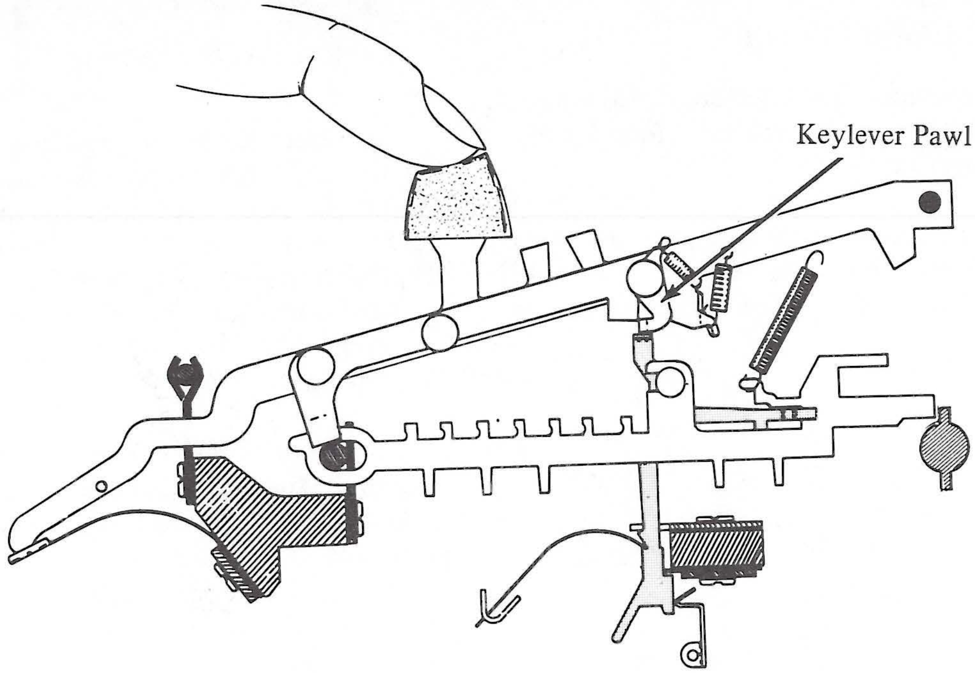


FIGURE 18-2

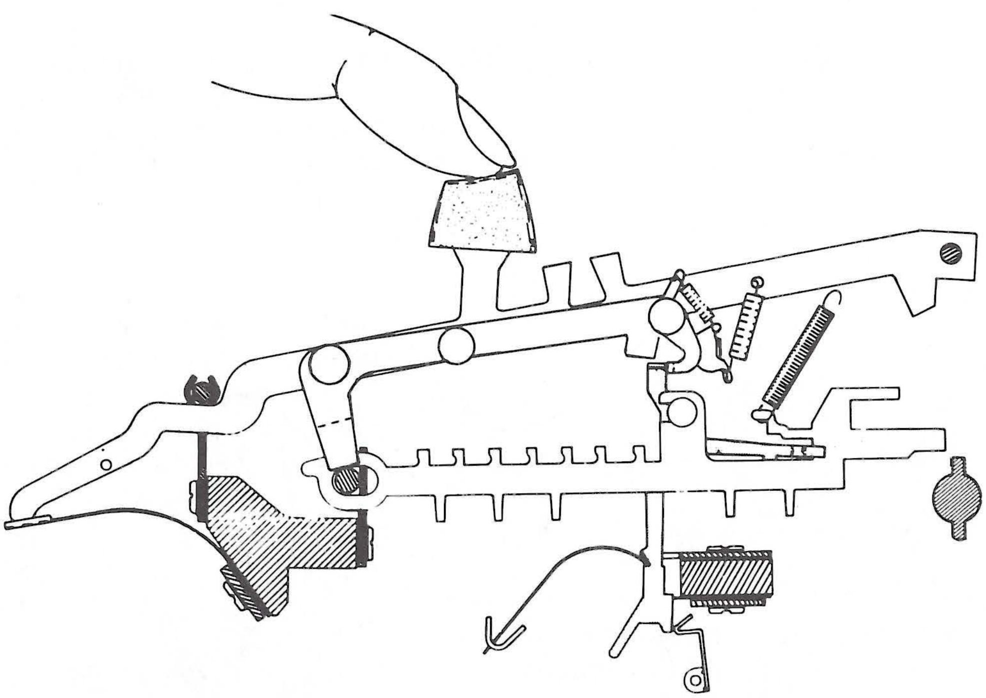


FIGURE 18-3

If the keylever is not free to restore as the filter shaft drives the interposer forward, the interposer latch pawl will be driven forward off the keylever pawl and as it restores to the rear the keylever pawl will pivot to the rear behind the interposer latch pawl (Fig. 18-3).

Further depression of the keybutton will cause a repeat operation. As the keylever continues to move down the front lug and the bellcrank will be prevented from moving lower because the front interposer fulcrum rod will restrict its downward travel. Depressing the keylever further will cause the bellcrank to overcome its spring tension and move down at the rear. The rear lug on the bellcrank then contacts the interposer latch pawl causing it to trip off the cycle clutch (Fig. 18-4).

The size of the lug on the bellcrank prevents the interposer latch pawl from restoring. Therefore, the

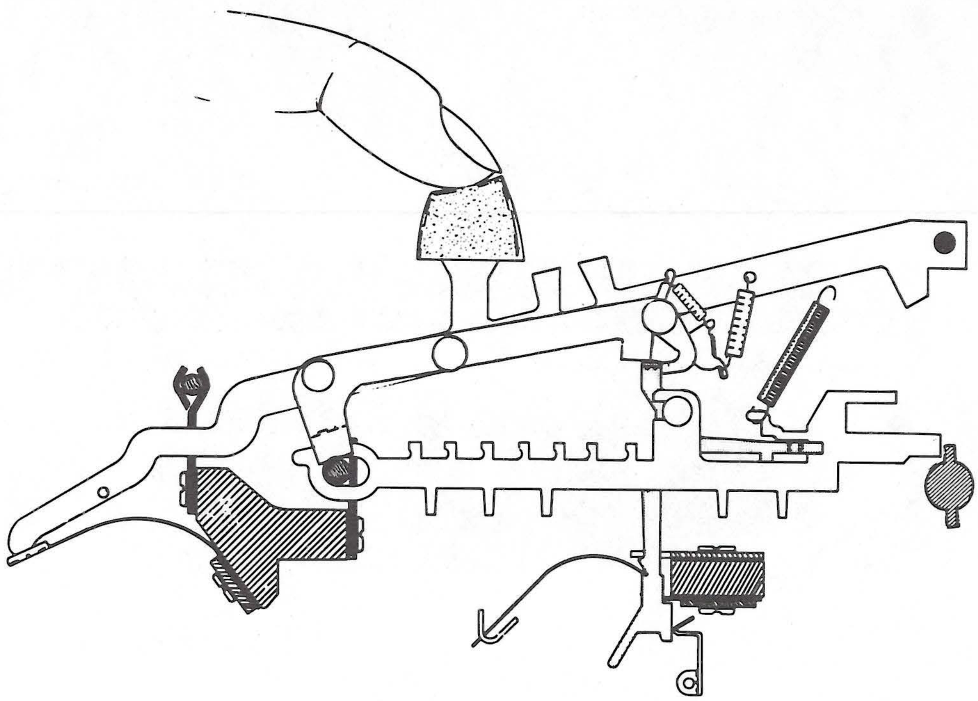


FIGURE 18-4

machine stays in a repeat operation until the keybutton is released. The moment that the bellcrank contacts the front interposer fulcrum rod the operator must then overcome the additional spring pressure of the keylever bellcrank. This provides the additional spring tension to prevent unwanted repeat cycles.

VERTICAL RULING

Vertical Ruling may be accomplished in three ways:

1. Using the variable spacebar the operator may position the carrier at the desired position and depress the desired character. This will result in a printed rule and escapement will occur. Since escapement did occur, a character backspace will be necessary to return to the original print point. After the backspace operation an indexing operation will position the print point directly below the previous vertical rule. The operator may now initiate another print operation. Proper leading must be taken into consideration to provide a continuous vertical rule.

2. Vertical ruling may also be accomplished by setting the left hand margin at the desired position of the vertical rule. A printed rule followed by a carrier return will position the carrier in the correct position to once again allow the operator to depress the ruling keybutton to print another rule.

3. The third method of vertical ruling involves the "catch tab" operation. The operator sets a tab at the desired position, tabs to that point and initiates a print cycle. Then depressing a carrier return followed immediately by a tab will position the carrier back at the correct position. The operator then pushes another character keybutton to print another rule.

AUTO MANUAL VELOCITY CONTROL

The Auto/Manual velocity control is an optional feature available to allow the operator to override the keyboard velocity selections and select either low, medium, or high velocity impact for any character selection. It also provides the ability to select the correct velocity selections when using bilingual fonts.

The Auto/Manual velocity control may be divided into two separate and distinct areas. Manual velocity control may be installed alone on machines below serial number 5014200. Any machine above this serial number will have Auto/Manual if a velocity control feature is installed. Auto velocity control cannot be field installed on machines below serial number 5014200.

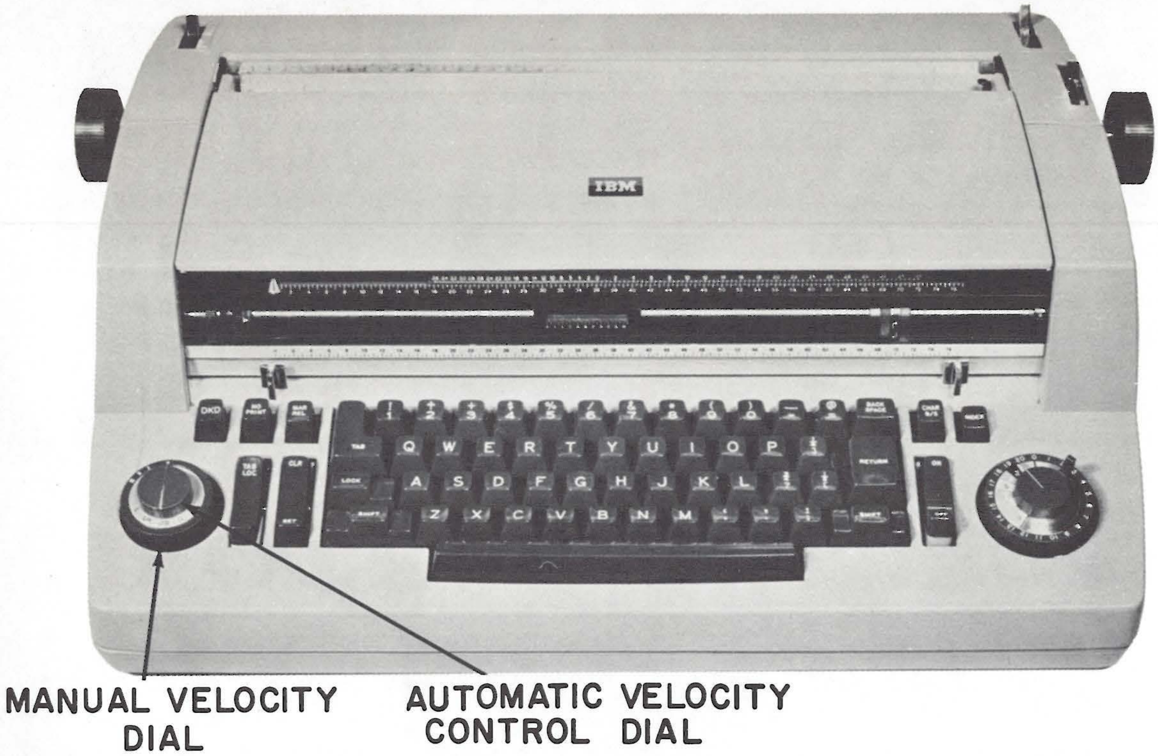


FIGURE 18-5

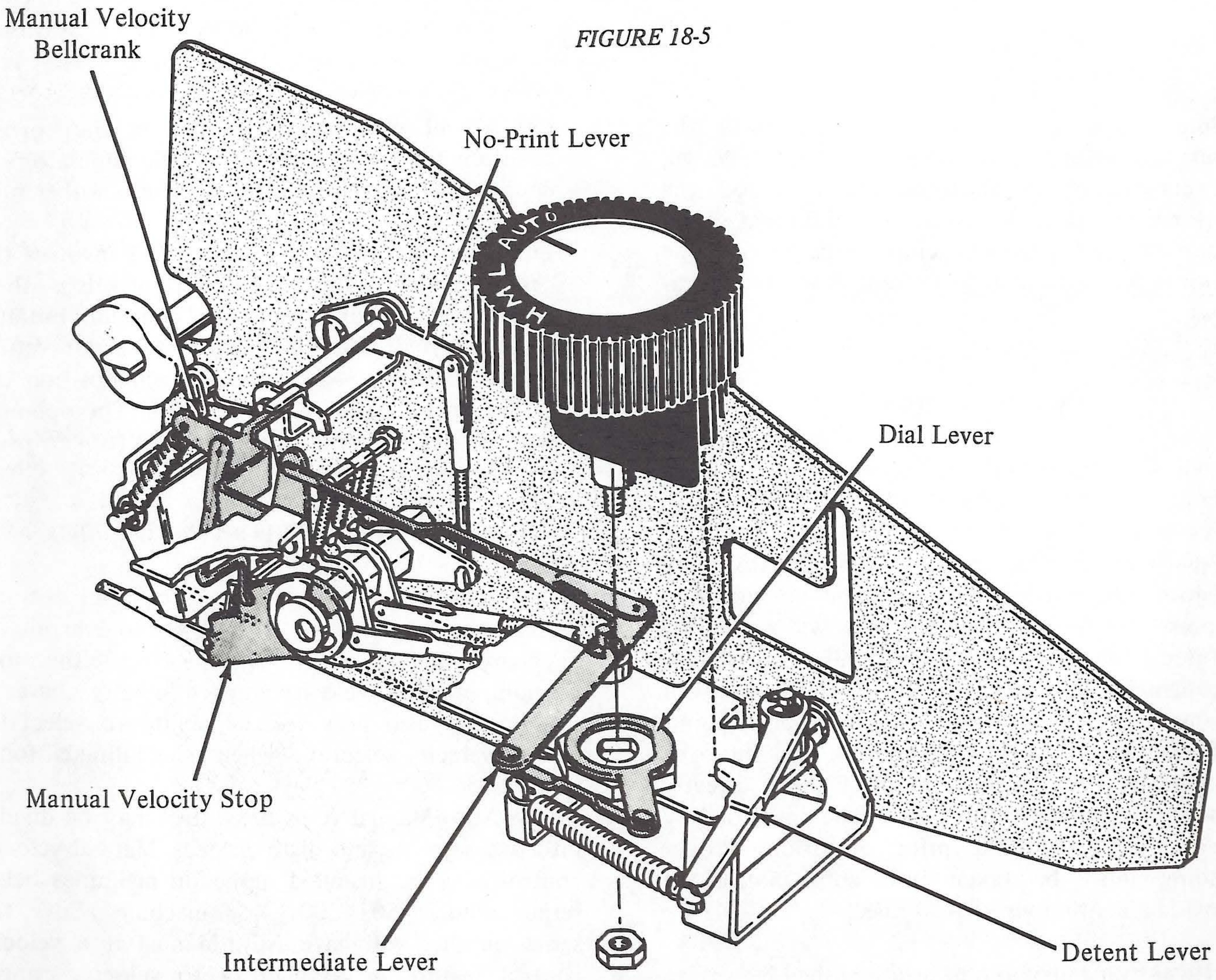


FIGURE 18-6

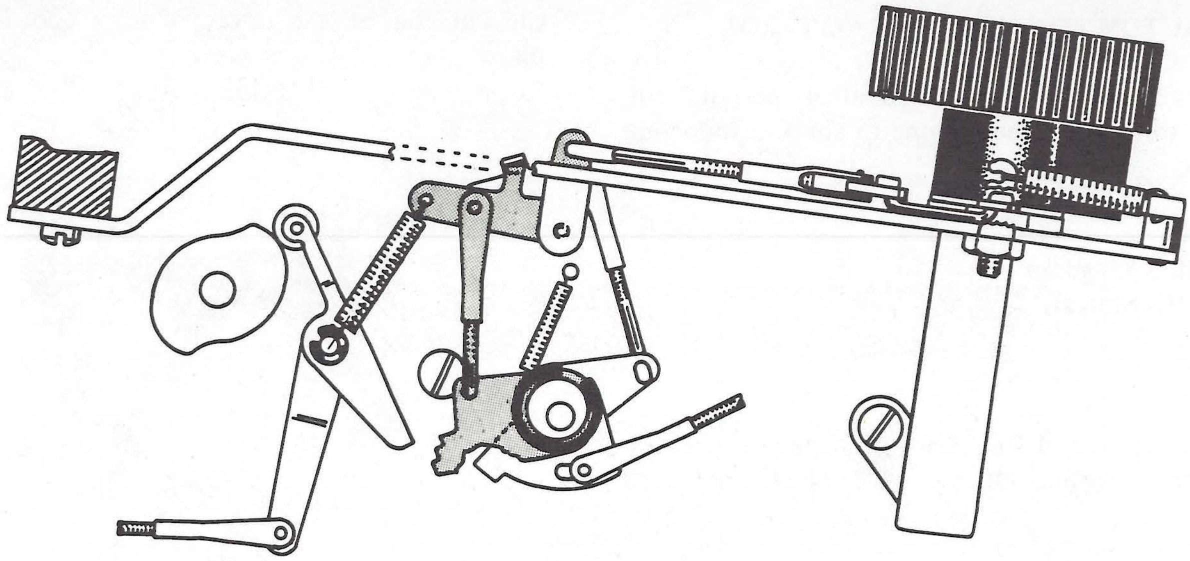


FIGURE 18-7

MANUAL VELOCITY CONTROL

The manual velocity control, which is an optional feature, permits the operator to manually select whatever velocity she desires for a specific print cycle. Rotating the dial to either a high, medium, or low velocity setting causes that velocity to be produced on every character selection for as long as the dial is held in that setting. Any time that the machine is placed under the manual velocity control the automatic velocity selection system becomes ineffective. Rotating the manual velocity dial to the "AUTO" setting returns the machine to the normal automatic velocity control mode.

The manual velocity control mechanism mounts on a bracket that is attached to the left keyboard sideframe. The dial, located on the forward portion of the bracket, mounts and pivots about a large shouldered stud. A detent lever that pivots on a stud riveted to the bracket is spring loaded against detenting surfaces on the hub of the dial (Fig. 18-6). A dial lever keyed to the hub of the dial transmits the dial motion through a link to the intermediate lever. From here, the motion is carried by the intermediate lever link back to the manual velocity bellcrank. This bellcrank, which is riveted to the bracket, performs two functions. When rotated clockwise a horizontal lug, which rests directly under a portion of the no-print bail lever, causes the no-print lever to be rotated top to the front into its no-print position. This causes the high, medium, and low velocity stops to be removed from the path of the velocity cam follower. This is what makes the action of the automatic velocity selection become ineffective.

Having removed the three velocity stops from the path of the cam follower, the manual velocity bellcrank then performs its second function. It rotates the manual velocity stop into its selected position according to the setting of the dial (Fig. 18-7). This stop mounts on an eccentric shoulder of a collar which is set screwed to the same stud that mounts the other velocity stops. A large "C" clip holds it in place. The stop contains three steps that function as stopping surfaces for the velocity cam follower. The depth of these steps provides the proper cam follower motion for either a high, medium, or low velocity selection. When the dial is returned to the AUTO setting, the manual velocity stop is rotated counterclockwise so that it cannot interfere with the automatic operation of the cam follower.

The extension spring fastened to the rear arm of the manual velocity bellcrank serves to remove the play in the linkage from the dial to the bellcrank. This assures that the play in the linkage will not affect the positioning of the manual velocity stop.

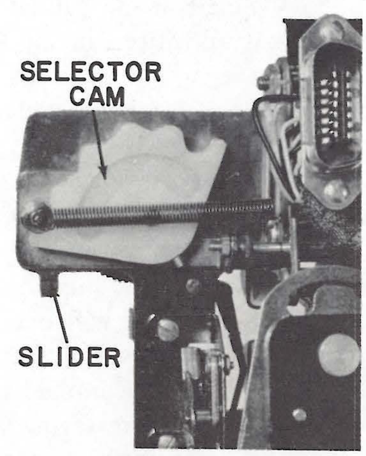


FIGURE 18-8

AUTOMATIC VELOCITY CONTROL

The automatic velocity control permits the operator to manually select one of the five following positions:

a. Latin
b. United Kingdom
c. United States
d. Germanic
e. Nordic

Selecting any one of the above positions will provide the correct printing impact levels for the position selected.

The automatic velocity control mechanism mounts on the same bracket as the manual velocity control The automatic velocity control dial is mounted above and is concentric with the manual velocity control dial. A shaft molded in the dial extends down through the velocity control mounting bracket. The selector cam, a large nylon cam with detents along one side, is set screwed to the dial shaft (Fig. 18-8). The selector cam is detented in position by a cam follower mounted on the cam follower slider. The cam follower slider assembly is free to slide laterally left and right on the shouldered portion of the dial adjusting nut. Its vertical motion is limited by the adjusting nut shoulder and the mounting bracket. The cam follower also provides support to the left end of the slider because the cam follower mounting screw has a shoulder that slides in a slot in the mounting bracket. An extension on the right of the slider contains an adjusting screw that contacts the left end of the low velocity code bail. A heavy extension spring loads the slider to the right. The spring mounts between the cam follower and the mounting bracket. The low velocity code bail is spring loaded to the left by a compression spring located between the keyboard side frame and the lower velocity code bail lever. Moving the low velocity code bail laterally will change the lower velocity positions in the keyboard.

Rotating the auto velocity control dial will cause the selector cam to rotate (Fig. 18-9). This will move the cam follower to a new position, and with it, the slider assembly. The cam follower slider restoring spring is much heavier than the low velocity code bail restoring spring. Therefore, if the slider assembly is allowed to move to the right it will overcome the lower velocity code bail restoring spring and move the bail to the right. If the slider is cammed to the left then the low velocity code bail restoring spring will move the bail to the left until it contacts the adjusting screw on the slider assembly. This is how the shifting of the lower velocity code bail takes place.

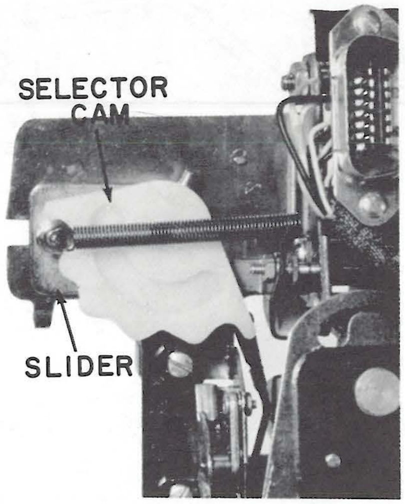


FIGURE 18-9

DEAD KEY

The dead key mechanism is an optional feature that provides the "Selectric" Composer with a flexible accent placement capability. This is especially desirable in those languages where combinations of accents and letters are too numerous to permit each accent to appear individually on the typing element with the letter that it is used with. When a dead key is depressed the accent prints but no escapement occurs. The character to be accented is then printed directly under or over the accent, and the proper character alignment results.

A dead key function is achieved simply by using the selection motion of the keyboard interposer to inhibit the action from the escapement cam to the escapement pawl. Machines equipped with a dead key mechanism contain a seventh selector bail in the keyboard and a special escapement cam follower. Each dead key interposer has an extra selector lug to operate this seventh bail. The bail is linked to the special cam follower and when actuated conditions the cam follower so that the motion produced will be dissipated without tripping the escapement pawl. The dead key interposers are in position 38 and 41.

The dead key selector bail mounts on the bail anchor plates in the keyboard as shown in Fig. 18-10. When the bail is driven forward by a dead key interposer a top to the rear rotation to the escapement disconnect shaft is produced. This is accomplished through the escapement disconnect link. The forward end of the link is fastened to the bail by a stud that protrudes through a hole in the link. The stud is a part of a

plate welded to the bail. An adjustable plate connects the rear of the link to an arm on the escapement disconnect shaft. This plate serves in adjusting the length of the disconnect link so that the proper rotational rest position of the disconnect shaft can be gained.

The selector bail, disconnect link, and disconnect shaft are spring loaded into their rotational rest position by the extension spring on the forward end of the link (Fig. 18-10).

Since a dead key operation is initiated through the selection motion of a keyboard interposer and this motion begins and ends well before the escapement cam starts to develop motion to its cam follower assembly, it is necessary that the cam follower assembly be designed so that it can be triggered into a dead key mode for one cycle. That is, driving a dead key interposer forward by the filter shaft early in the print cycle will condition the escapement cam follower assembly so that when it is operated, later on after the dead key interposer has restored, a dead key operation will result.

Since an escapement operation can carry well into the next print cycle, especially during a 9 unit escapement, it is necessary that the escapement cam follower assembly be designed so that it can be triggered into a dead key mode regardless of whether the escapement trip link and lever are at rest or in their active positions. Recall that during an escapement operation the backspace holding pawl is latched out of the pinwheel by latching the escapement trip lever in its active position. This is accomplished through the trip lever latch mounted on the tail of the escapement pawl.

Filling these requirements is achieved through a three piece escapement cam follower assembly whose operation involves two latching actions. The three pieces making up the assembly are the escapement cam follower, the latch plate, and the clevis plate (Fig. 18-10). The escapement cam follower mounts and pivots on a shaft on the tab/backspace operational bracket. An extension spring on the underside loads it against the escapement cam. Both the latch plate and clevis plate mount on the cam follower by the same rivet. The rivet is shouldered and the mounting holes in the plates are elongated so that each plate is free to slide up and down

An extension spring connected between the clevis plate and the formed lug at the top of the cam follower loads the clevis plate up and top to the front about its mounting rivet. This loading is opposed by the escapement trip link or, ultimately by the much stronger escapement trip lever restoring spring. Because of this arrangement a trip lever stop is needed to control the rest position of the trip lever.

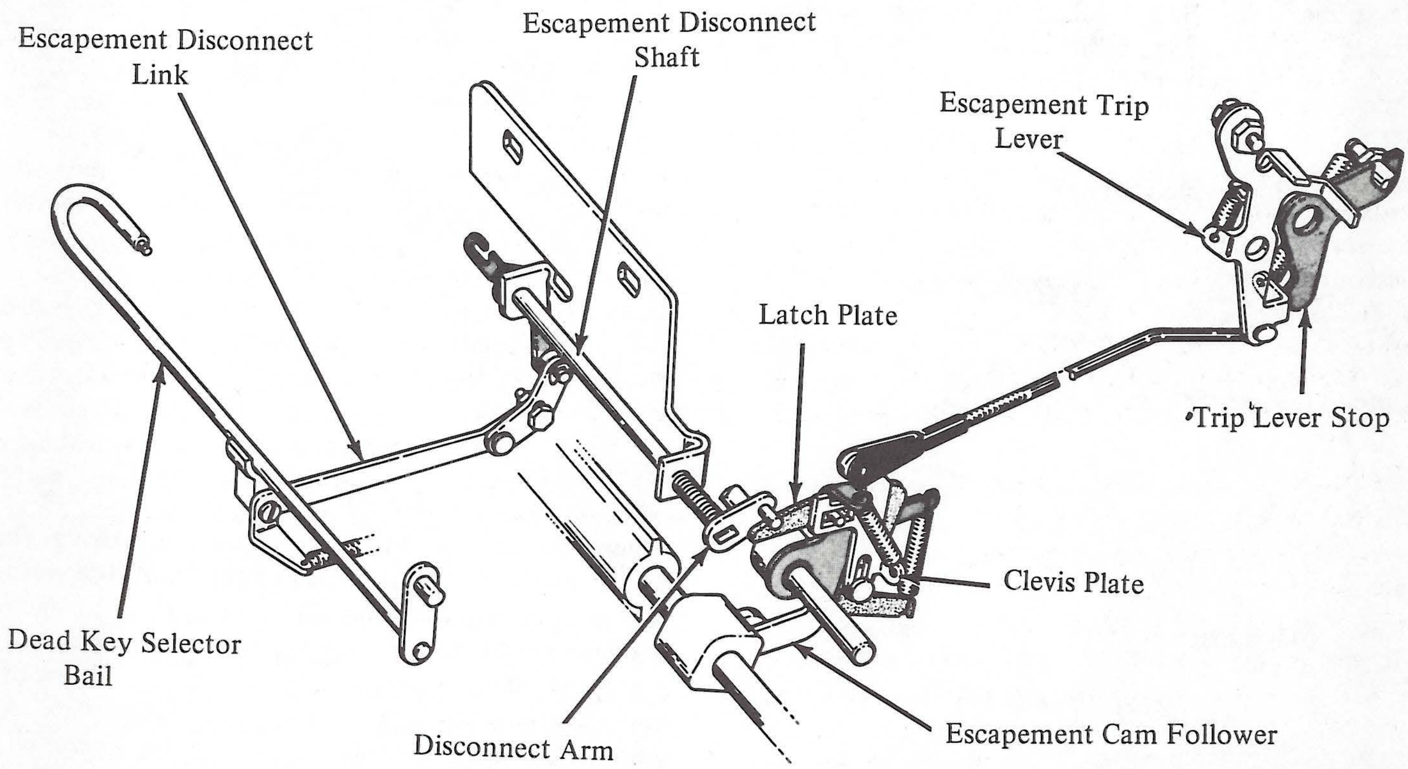


FIGURE 18-10

As long as the clevis plate is allowed to remain in its "up" position the lug on the forward end of the clevis plate remains in the operating path of the spring anchor lug on the escapement cam follower. When the cam follower is driven counterclockwise the spring anchor lug drives this lug forward with it. This causes the clevis plate to move with the cam follower and a pull is produced on the escapement trip link resulting in an escapement trip action.

To attain a dead key action the clevis plate is shifted down on its elongated mounting hole so that the lug on the clevis plate is no longer in the operating path of the spring anchor lug on the cam follower. Thus, when the follower is operated no motion is imparted to the clevis plate.

The latch plate, which is also spring loaded up and top to the front by an extension spring, is used to drive the clevis plate down and latch it down whenever a dead key operation is called for. A small pin on the right hand face of the latch plate operates in a window of the clevis plate. Whenever the latch plate is driven down this pin drives the clevis plate down also. The latch-down action comes from the secondary latching surface on the latch plate. Figure 18-11A shows the relationship between the cam follower, latch plate, clevis plate, and the disconnect arm when the machine is at rest. Note that the latch plate is latched on the spring anchor lug of the cam follower. The portion of the latch plate that contacts the spring anchor lug is called the primary latching surface. Observe the position of the pin in the window of the clevis plate (Fig. 18-11A).

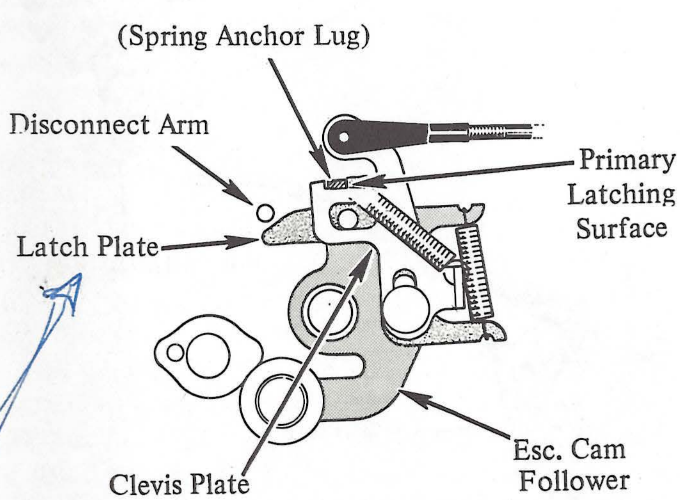


FIGURE 18-11A

During a dead key selection the disconnect arm drives the latch plate down causing the primary latching surface to move below the spring anchor lug.

When this happens the latch plate moves forward causing the secondary latching surface to move in underneath the spring anchor lug as shown in Figure 18-11B.

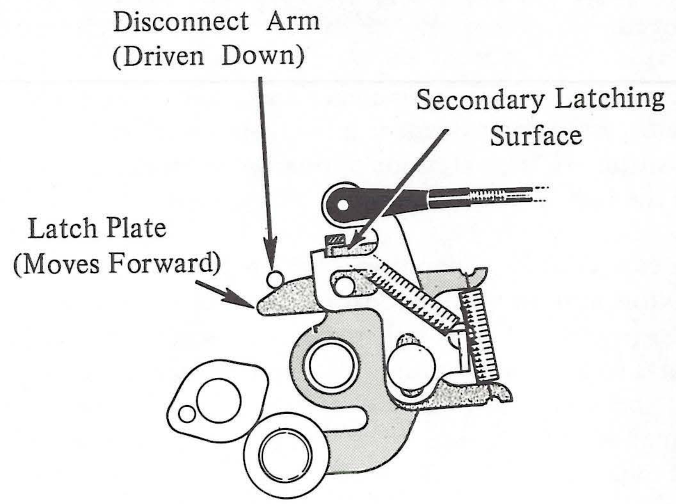


FIGURE 18-11B

Once the secondary latching surface has moved into its latching position the disconnect arm is free to return to its rest position (Fig. 18-11C). The escapement cam follower assembly is now latched into a dead key condition. It remains in this condition awaiting the action of the escapement cam.

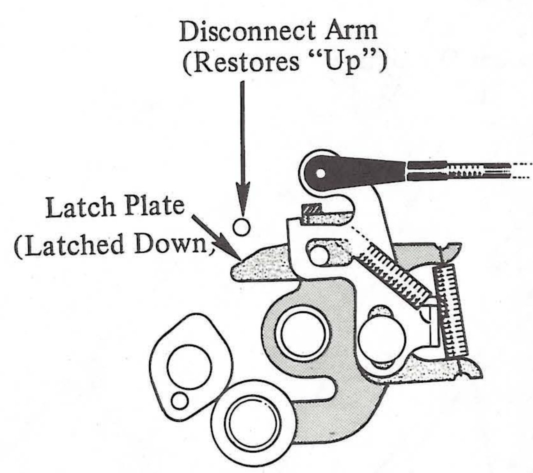


FIGURE 18-11C

When the escapement cam begins to drive the escapement cam follower top to the front, the spring anchor lug on the cam follower begins to move forward over the top of the lug on the clevis plate. At this same time, the spring anchor lug is also sliding off the secondary latching surface on the latch plate. As soon as the spring anchor lug clears the secondary latching surface the latch plate restores to its "up" position as shown in Figure 18-11D. The clevis plate is held down by the spring anchor lug.

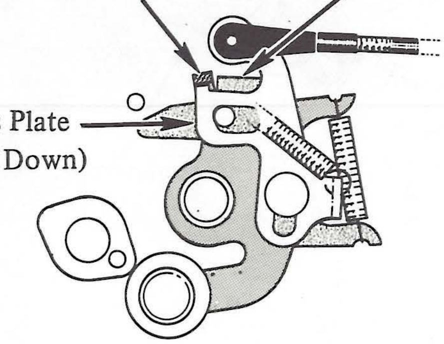


FIGURE 18-11D

As the escapement cam restores back to rest the spring anchor lug contacts the primary latching surface driving the latch plate to the rear. At the same time, the spring anchor lug is also sliding off the lug on the clevis plate (Fig. 18-11E). Just before the escapement cam

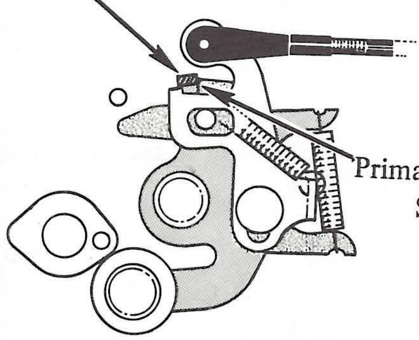


FIGURE 18-11E

follower reaches its rest position the clevis plate is released and is free to restore to its "up" position (Fig. 18-11A). At this point the assembly is ready to perform for the next cycle whether it be a dead key or a normal escapement operation.

The escapement cam follower and latch plate always return to their rest position by the end of a cycle regardless of whether the escapement operation has completed or not. This means that the escapement cam follower assembly is always ready at the beginning of a cycle to be placed in a dead key mode. The position or motive of the clevis plate at the beginning of a new cycle does not affect the dead key latching action of the latch plate.

Because the clevis plate is linked directly to the escapement trip lever its restoring time is affected by the amount of escapement selected. The clevis plate does not restore until the escapement pawl is driven back on its elongated mounting hole causing the trip lever to unlatch. Therefore, the clevis plate may or may not be at rest when a dead key selection occurs.

DEAD KEY DISCONNECT

Dead key disconnect is an optional feature found only on dead key machines with velocity control features. This feature increases the flexibility of the "Selectric" Composer by enabling the operator to disconnect the dead key operation through the depression of a keybutton.

When the dead key disconnect keybutton (located directly behind the manual velocity control dial) is depressed, all those keys that were dead keys will now become normal keys. That is, they will produce the escapement that is normally found in that position.

This feature is especially useful on machines that are used in bilingual applications.

DEAD KEY DISCONNECT

The dead key disconnect keylever assembly mounts on the velocity control bracket (Fig. 18-12). The keylever has a latch down notch similar to the No-Print keylever, so that it may be latched in its active position. Mounted directly below the keylever is the DKD bellcrank which pivots on a stud mounted on the keylever assembly. The DKD cable is connected to the rear arm of this bellcrank.

Depressing the Dead Key Disconnect keybutton will cause the bellcrank to pivot top to the front, creating a pull on the cable. The cable transfers motion to the escapement disconnect shaft pulling it to the left and further compressing the compression spring. It is this spring that loads the shaft, the cable, and the bellcrank to their rest positions. The moving of the shaft to the left causes the disconnecting operation. Mounted on the right of the shaft is the disconnect arm. If the stud on the disconnect arm is moved to the left, then as it rotates down it will not drive the latch plate down (Fig. 18-10). Therefore, a normal escapement operation will take place even in the dead key positions.

All machines being shipped from the plant have dead key bail, the dead key escapement cam follower

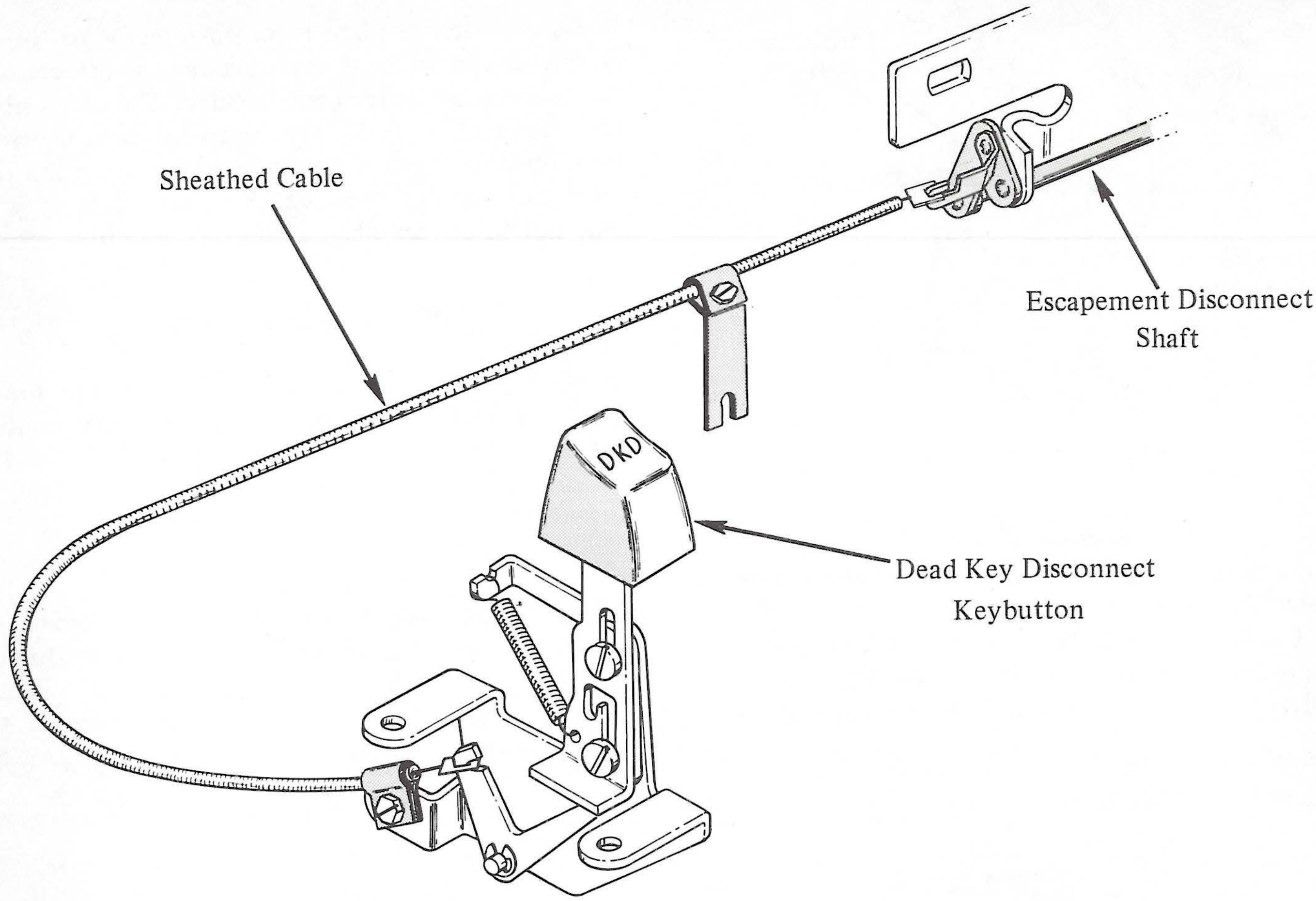


FIGURE 18-12

assembly, and the dead key disconnect shaft bracket on the machines. If the dead key feature is to be disabled, the mounting bracket is moved to the left. Therefore, the stud on the disconnect arm will not reach over the latch plate on the dead key escapement cam follower assembly.

COMPATIBLE COMPOSER

A compatible "Selectric" Composer (S/N 5014200 and above) is a machine that can be field converted to a modified composer.

The compatible machine will have such items as a dead key cam follower, hardened holes in the keylevers to receive keylever pull links, a no-print keylever and interposer, and auto/manual velocity control.

MODIFIED COMPOSER

A modified "Selectric" Composer is a machine that has been built or converted to be used as a MT/SC printer. It may be used as either a printer on the MT/SC System, or removed from the system and used as a composing machine.

A modified composer has pull links which are connected to the keylevers through hardened holes. The links attach to the keylevers like the typebar connecting links in the Model "D" (Fig. 18-13).

The lower end of the link extends through a slot in the keylever link comb and has its tip turned up 90 degrees so it has a pulling surface. The keylever link comb mounts by four screws to the front fulcrum support and the keylever guard. The keylever link comb serves several purposes (Fig. 18-14). It prevents excessive side play in the links which could cause the link to disconnect from the translator actuator. The comb also prevents the links from detaching accidentally from the keylevers. The comb also has two guide pins that serve to position the composer over the translator correctly. Located on the left end of the comb is the wiring harness connector, which provides an electrical interface connection between the system and the composer.

The photo cells are used to sense movement in the composer. One senses carrier movement and the other senses cycle shaft movement.

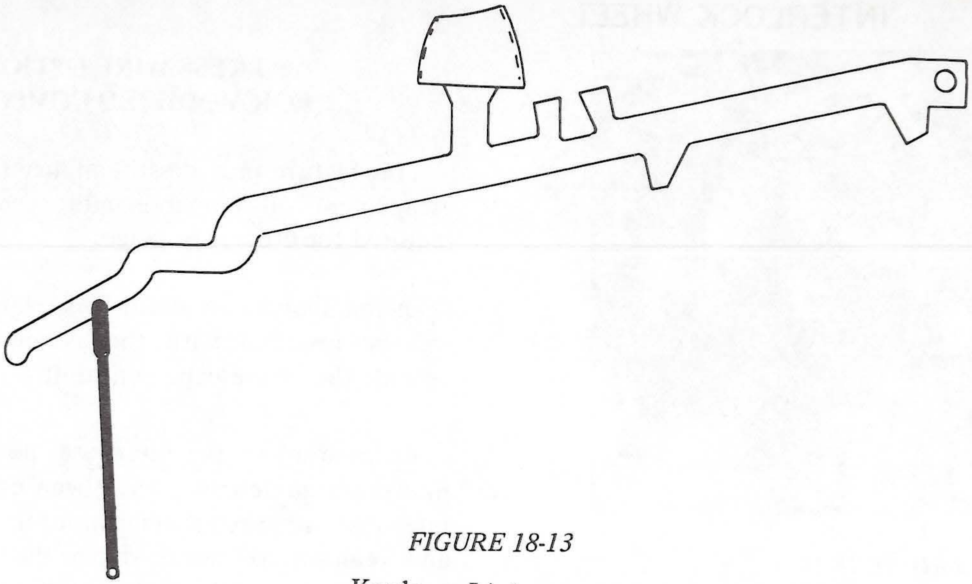


FIGURE 18-13

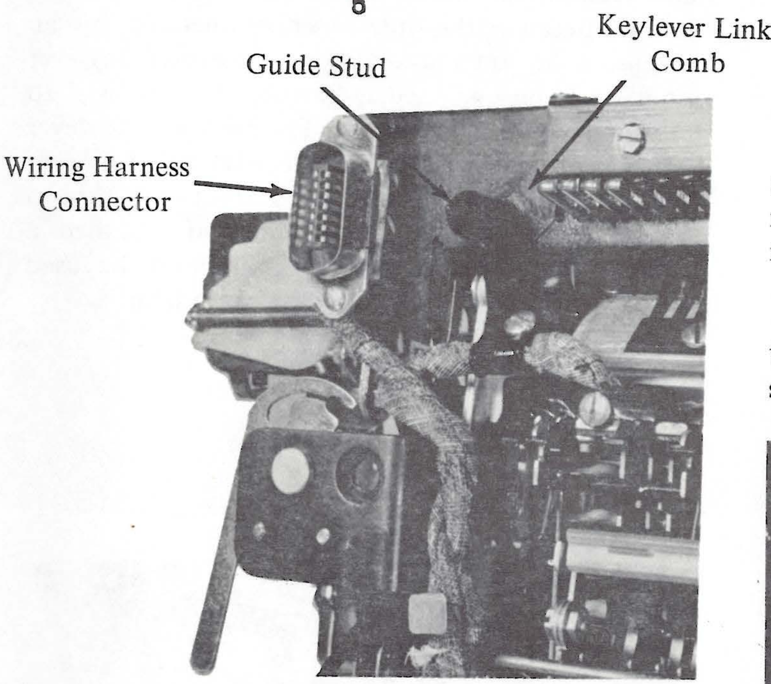


FIGURE 18-14

The system will receive the signals from the photo cells and use it to determine whether the composer is busy or ready for another operation.

One photo cell is mounted on a bracket on the left hand power frame just below the cycle shaft (Fig. 18-15). A timing wheel is shaped like a butterfly with timing slots in it. The timing wheel is set screwed on the cycle shaft, so that when a print or spacebar operation is underway, a signal is developed. The other photo cell is mounted on interlock bracket which is mounted on the backspace bracket (Fig. 18-16). It is mounted and functions in a similar manner to the other photo cell. The only difference is the wheel, called the interlock wheel. The interlock wheel is set screwed to the rear of the escapement shaft. It has slots cut around it circumference which extend toward the center.

If the wheel is in motion a signal will be generated and passed on to the system. When the wheel is moving the carrier is moving, so the system senses this movement and does not start another operation.

The wiring harness is used to provide current for the photo cell light sources and to feed the photo cell signals to the system.

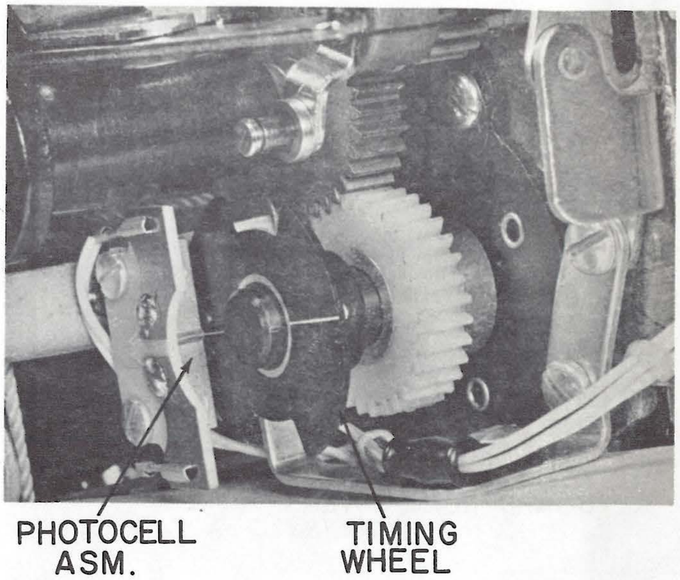


FIGURE 18-15

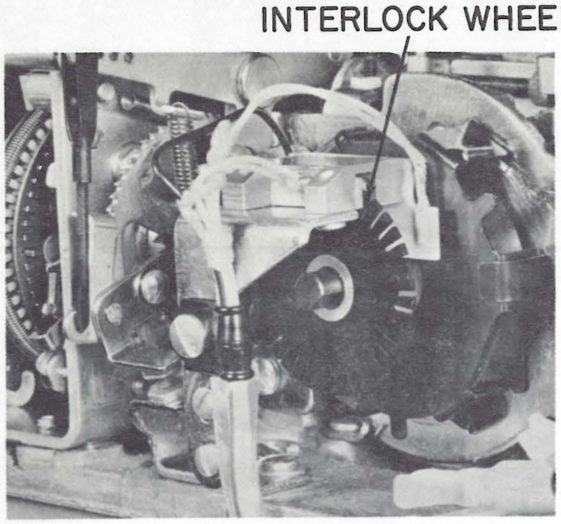


FIGURE 18-16

When the modified composer is used as a stand alone, (off of the system), a snap on plastic cover will protect the keylever links from damage (Fig. 18-18). A sound cover may be used to limit the noise level of the keyboard and translator when the machine is used as an MT/SC printer (Fig. 18-17). Since indexing is still required for paper insertion a cover indexing keybutton is incorporated. This keybutton which is mounted on the upper right of the cover is spring loaded up by a compression spring. Pushing on the keybutton will transfer the motion to the indexing keybutton on the printer. This will result in indexing the printer.

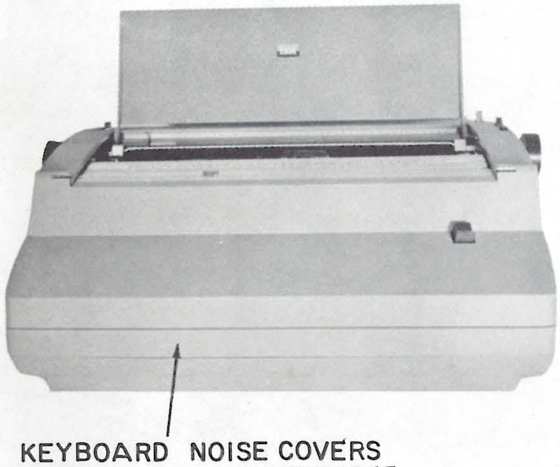


FIGURE 18-17

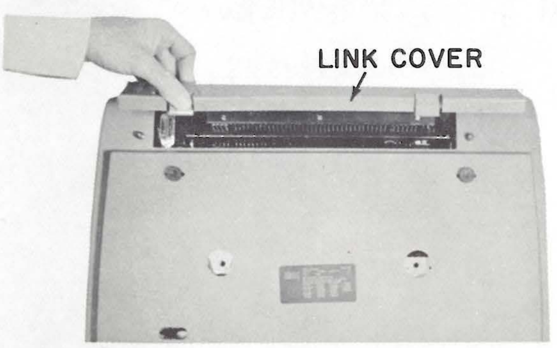


FIGURE 18-18

PRESS WIRE OPTION FOR MODIFIED COMPOSER

This feature provides the ability to select four unit escapement on numerals and special characters as required for press wire usage.

In this feature an auxiliary keylever and interposer will be installed with the associated hardware to provide the four escapement unit.

Because all of the interposer positions in the rear interposer guide comb have been used the press wire interposer requires special mounting. The interposer and keylever are mounted near the left keyboard side frame. Because the interposer is operated by an extension lug on the keylever, a crossover keylever similar to the one used in carrier return is used to provide stability (Fig. 18-19). The press wire keylever mounts in the third (from the left) rear keylever guide comb slot. This keylever does not have a keybutton or a keybutton stem and is called a dummey keylever. The keylever will only be used when the composer is mounted on the system.

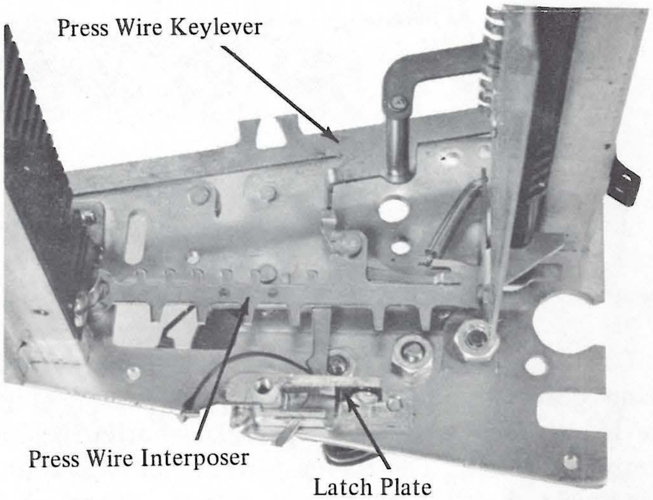


FIGURE 18-19

The interposer mounts about the front interposer fulcrum rod in the front, but since the rear interposer guide comb does not extend to the left far enough the interposer has its own rear interposer guide. This rear interposer guide mounts on the inside of the keyboard side frame on the velocity stop stud.

The interposer also requires its own latch plate. A small pawl latch block, fastened to the keyboard side frame by two screws and spacers, provides the mounting surface for the latch plate. The pawl latch block assembly also contains the front interposer latch pawl guide which functions to stabilize the interposer latch pawl. The latch pawl bias spring is attached between the ear on the interposer latch pawl guide and the interposer latch pawl.

An extension on the 4 unit escapement bail extends in front of a lug on the interposer.

Any time the press wire keylever is operated in conjunction with a character of higher escapement value, that character will print and receive a four unit escapement selection.

The press wire interposer does not work in the compensator tube, so two keylevers may be pulled simultaneously.